# DISSERTATION ON

# ASSESS THE EFFECTIVENESS OF INTRADIALYTIC LOW-INTENSITY STRETCHING EXERCISE ON MUSCLE CRAMPS AMONG PATIENTS UNDERGOING HAEMODIALYSIS AT DIALYSIS UNIT, RAJIV GANDHI GOVERNMENT GENERAL HOSPITAL, CHENNAI-3

**M.Sc. (NURSING) DEGREE EXAMINATION**
**BRANCH – I MEDICAL SURGICAL NURSING**

**COLLEGE OF NURSING**
**MADRAS MEDICAL COLLEGE, CHENNAI-03**

***A Dissertation submitted to***

**THE TAMILNADU DR.M.G.R MEDICAL UNIVERSITY**
**CHENNAI – 600 032**

***In Partial fulfillment of requirement for the degree of***

**MASTER OF SCIENCE IN NURSING**

**APRIL -2012**

# CERTIFICATE

This is to certify that this dissertation titled **"Assess the effectiveness of intradialytic low-intensity stretching exercise on muscle cramps among patients undergoing haemodialysis at Dialysis unit, Rajiv Gandhi Government General Hospital, Chennai-3"** is a bonafide work done by Ms.Jeeva.N, College of Nursing, Madras Medical College, Chennai-03 and submitted to The Tamilnadu Dr.M.G.R. Medical University, Chennai in partial fulfillment of the University rules and regulations, towards the award of the degree of Master of Science in Nursing, Branch -I, Medical Surgical Nursing under our guidance and supervision during the academic period from 2010 – 2012.

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# "ASSESS THE EFFECTIVENESS OF INTRADIALYTIC LOW-INTENSITY STRETCHING EXERCISE ON MUSCLE CRAMPS AMONG PATIENTS UNDERGOING HAEMODIALYSIS AT DIALYSIS UNIT, RAJIV GANDHI GOVERNMENT GENERAL HOSPITAL, CHENNAI-3 "

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# ACKNOWLEDGEMENT

**I am grateful to almighty for his wisdom, strength, guidance and support throughout the endeavour.**

The investigator owes a deep sense of gratitude to all those who have contributed to the successful completion of this endeavour.

I express my deep sense of gratitude and respect to **Dr.Ms.R.Lakshmi, M.Sc (N).,Ph.D., Principal ,** College of Nursing, Madras Medical College Chennai-03, for her mentorship by guidance, encouragement, motivation and being a role modeling in the field of Nursing Research.

I am thankful to **Dr.V.Kanagasabai M.D., Dean,** Madras Medical College, Rajiv Gandhi Government General Hospital, Chennai -03, who permitted me to conduct the study.

I am grateful to my esteemed guide **Dr.Mrs.K.Menaka,M.Sc (N)., Ph.D., Reader in Nursing,** HOD of Medical Surgical Nursing, College of Nursing, Madras Medical College Chennai-03 for her timely guidance and constant source of inspiration, encouragement, motivation, enlightening ideas, valuable suggestions and excellent guidance , with out whom this study would not have molded in this shape. I profusely thank her for her guidance from the beginning to the end of the study.

I express my gratitude to **Dr.N.Gopalakrishnan, M.D.,D.M., FRCP, HOD and Professor,** Department of Nephrology, Rajiv Gandhi Government General Hospital, Chennai -03 for granting permission to conduct the study, sharing his valuable thoughts and guiding me for completion of study.

I am grateful to **Dr.Mrs.P.Mangala Gowri M.Sc (N)., Ph.D., Former Principal,** College of Nursing, Madras Medical College, Chennai-03 for her timely guidance, mentorship and encouragement.

I express my heart felt gratitude to **Mrs.A.Thahira Begum, M.Sc. (N), M.Phil, Lecturer in Nursing,** (Medical Surgical Nursing) for her timely guidance and valuable suggestions. Heartfelt thanks to **Mrs.R.Thangam, M.Sc.(N)**, Nursing Tutor,(Medical Surgical Nursing) for her support through out this study.

I owe a great deal of appreciation to **Dr.Shakthi**, **Staff Nurses, Dialysis Technicians and students, Department of Nephrology,** Rajiv Gandhi Government General Hospital, Chennai -03 for their guidance and constant support throughout the study.

I wish to express my gratitude to all the faculty members of College of Nursing, Madras Medical College, Chennai-03, for their valuable guidance in conducting the study.

Its my privilege to convey my sincere thanks to the following experts from Medical Surgical Nursing Specialists who have validated the research tool and has guided me with their valuable suggestions and corrections **Prof.Mrs.Kanniammal, M.Sc (N), Ph.D,** Meenakshi College of Nursing, Kanchipuram, **Mrs.Rama Sambasivam, M.Sc(N),Ph.D, Principal,** A.J.College of Nursing, Chennai.

I acknowledge my sincere thanks to **Mr.A.Vengatesan,M.Sc, M.Phil., PGDCA., Ph.D., Lecture in Statistics**, Madras Medical College, Chennai-3 for his valuable suggestions in the analysis and presentation of the data.

I am thankful to **Mr.S.Ravi, M.A,M.LIS, Librarian,** College of Nursing, Madras Medical College Chennai-03 and also the Librarians of Madras Medical College and The Tamilnadu Dr.M.G.R.Medical University for their co-operation in collecting the related literature for this study.

I express my heartfelt gratitude to the **Nursing Superintendent, Grade - I, Grade- II,** Rajiv Gandhi Government General Hospital, Chennai who have extended their co-operation during the study.

My earnest gratitude to all the **Dialysis unit Patients** who have actively participated in my study for their support and patience to complete my study successfully.

I extend my deepest sense of gratidute to **Mr.V.Durai, M.A., M.Phill., Principal**, Government Higher Secondary School,Pattabiram, for validating the English content of my study.

I thank my **classmates and friends** who rendered help and support during the study.

I will forever remain thankful to **my parents, my husband A.Dhinakaran and my loving daughter D.Sruthi** who have been pillars of my strength and their earnest prayers to me in completing this study.

I thank **Mr.Ahmed** (Shajee Computers), and **Mr.Ramesh** (MSM Xerox) for their help and patience in printing and completing this dissertation work.

My research could not have been completed with out the unrelenting support of these good hearted people. I owe a deep sense of gratitude to who ever contributed to the accomplishment of this study. A bouquet of gratitude to all of them.

# ]ABSTRACT

Haemodialysis is a procedure done to manage client with end stage renal failure by using an artificial kidney to replace the excretory function of the failed kidneys. Health personnel's and family members of clients are more concerned with the physiological problems of the patients. Some of the physiological problems are given less or no importance, for example muscle cramps which occurs during haemodialysis. The current study assesed the effectiveness of intradialytic low-intensity stretching exercise on muscle cramps among patients undergoing haemodialysis at Dialysis unit, Rajiv Gandhi Government General Hospital.

The aim of the study is to reduce the frequency, duration, quality, intensity of muscle cramps. Based on true experimental design – post test only control group design 80 samples were selected and randomised. The intradialytic low- intensity stretching exercise given for the patients under experimental group at the end of first hour of haemodialysis. The post intervention assessment done at the end of each hour of the cycle. The characteristics of muscle cramps were assessed with out any intervention for control group. The findings were given score and interpreted and analysed. The results showed that there was a significant difference between experimental and control group. Overall the effectiveness of intervention is 24.5% in experimental group, whereas with routine care in control group is 7.1%. Experimental group benefited more than control group (17.4%).

Thus,the study was concluded that intradialytic low-intensity stretching exercise can be effectively used to reduce the frequency, duration, quality, intensity and decrease the muscle tone of the patients who are undergoing haemodialysis. The intervention given during the haemodialysis session is simple and effective method to treat muscle cramps. Intradialytic low-intensity stretching exercise can be added as an adjunct treatment for dialysis patients.

# CHAPTER – I
# INTRODUCTION

***"It's hard when you pick a disease that lives in the outskirts of medical knowledge", we will try to move the disease down town".***

**- Derek Doyle**

Different kidney pathogenesis challenge the functions of human body and puts human life danger. Two such important pathogenesis are acute and chronic renal failure. Acute kidney injury is common among hospitalized patients. It affects some 3-7% of patients admitted to the hospital and approximately 25-30% of patients in the Intensive care unit. Depending on the cause, a proportion of patients will never regain full renal function, thus having end-stage renal failure requiring lifelong dialysis or a kidney transplant.

Before the advancement of modern medicine, acute kidney injury might be referred to as uremic poisoning. Starting around 1847, this term was used to describe reduced urine output, now known as oliguria. Acute kidney injury due to acute tubular necrosis was recognized in the 1940s in the United Kingdom, where crush injury victims during the London Blitz developed patchy necrosis of renal tubules, leading to a sudden decrease in renal function. Once the cause is found, the goal of treatment is to restore kidney function and prevent fluid and waste from building up in the body while the kidneys heal. But in early years itself some had the vision and courage to risk everything in search of the answer for stretching renal failure and the first clinical dialysis on a uremic man was performed in October 1924 by ***George Hass*** in Germany.

Acute kidney failure is potentially life-threatening and may require intensive treatment. However, the kidneys usually start working again within several weeks to months after the underlying cause has been treated. In some cases, chronic renal failure or end-stage renal disease may develop. Death is

most common when kidney failure is caused by surgery, trauma, or severe infection in someone with heart disease, lung disease, or recent stroke.

Chronic kidney disease also known as chronic renal disease, is a progressive loss in renal function over a period of months or years. Severe kidney disease requires one of the forms of renal replacement therapy; this may be a form of haemodialysis, peritoneal dialysis but ideally constitutes a kidney transplant.

Haemodialysis is a procedure done to manage client with end stage renal failure by using an artificial kidney machine to replace the excretory function of the failed kidneys. Health personnel and family members of the clients are more concerned with the physiological and psychological problems faced by the clients. Therefore, the study was undertaken with a view which could help to overcome these problems positively.

Muscle cramping of the hands, feet, and legs is fairly common on haemodialysis. The cause of muscle cramping is unknown. However, three conditions that seem to increase cramping are hypotension, the patient being below dry weight and use of low sodium dialysate solution. A muscle cramp can be explained an involuntarily and forcibly contracted muscle that does not relax. A muscle that involuntarily (without consciously) contracts in a "spasm." If the spasm is forceful and sustained, it becomes a cramp. Muscle cramps cause a visible or palpable hardening of the involved muscle in the calf region. The calf muscles consist of the Gastrocnemius which is the biggest muscle at the back of the lower leg and the Soleus muscle which is the smallest muscle under the Gastrocnemius.

Muscle cramps are more commonly associated with low blood pressure. However, some cramping continues even after a normal blood pressure is obtained. In fact, muscle cramping can occur even without a fall in blood pressure. Muscle cramps also can occur when patients are below the dry weight. The severe muscle cramping experienced near the end of the dialysis treatment and persisting for a time after dialysis often is due to dehydration. Treatment for cramping vary from unit to unit. When patients

are having cramping and have low blood pressure, the staff may give normal saline. This will increase the fluid in your body and muscle cramping may be relieved to some extent. In addition, hypertonic saline or glucose may be given. Heat and massage for the cramping muscle can ease the pain.. For chronic leg cramps they may prescribe Quinine, Carnitine, or another medication. The investigator had tried a program of gentle stretching and toning exercises targeted at the muscles which may tend to cramp during dialysis.

Intradialytic exercise programs are important to enhance patient physical functioning, exercise capacity, and improve overall health. This should become a standard of treatment for all dialysis units. Although having an exercise professional to run the program would be ideal, with the available resources to the dialysis community, an exercise program could become a reality managed solely by the dialysis staff. The research on exercise and dialysis clearly shows a positive benefit for patients with end stage renal disease. With a clinic-wide commitment, an exercise program can be created and managed with positive physical and emotional outcomes for their patients.

***Carlson et al (2007)*** outlines staff responsibilities to exercise for dialysis patients, including how the staff can influence patients, administrative roles, and assessing resources. Having a physician order to encourage and offer exercise should result in staff members being consistent in offering exercise to their patients. Dialysis patients obviously have many factors that may result in irregular participation in exercise. Thus, just as all of us in the "apparently healthy" population need motivation and encouragement to exercise regularly, patients may need extra encouragement. Continuous education, counseling, and reinforcement with the patients will be needed to make exercise as a routine part of the dialysis treatment.

## 1.1. NEED FOR THE STUDY

The investigator during her posting in the haemodialysis unit had a chance to interact with many patients undergoing haemodialysis. It was

observed that the patients are more concerned with the complication of haemodialysis. Muscle cramps are a common complication of haemodialysis treatments, occurring in 33 to 86 percent of patients, they often result in the early termination of a haemodialysis session and are therefore a significant cause of underdialysis. The exact etiology of cramps in dialysis patients is unknown. Since cramps tend to occur most frequently near the end of haemodialysis treatments, changes in plasma osmolality and/or extracellular fluid volume have been implicated.

***Lee (2005)*** quoted in dialysis and transplantation journal that in a specify study involving 140 haemodialysis treatment on 103 patients the cumulative incidence of cramps was established to be 86%. Since cramps are common intradialytic event, the discomfort leads to premature termination of the treatment.

The number of patients with renal failure whose lives have been extended by dialysis has been increasing dramatically. At the national level, average annual increase of 11.1% in the number of chronic dialysis patients has been reported. Advances in medical interventions have improved the life expectancy of many individuals with chronic disease. Hence, as the quality of biomedical care has improved, physiological factors have become increasingly more important in determining the extent to which a patient will cope successfully with treatment.

Kidney diseases are common in our population. The incidence of chronic kidney disease will rise to 36 million people by the end of 2015 world wide (World Health Organisation, 2010). In India 10 lakh people suffer from kidney failure and more than four crores are at risk (Tamil Nadu Kidney Research Foundation, 2010). In South India , average of 500 patients register for haemodialysis each year (Health Management Centre,2009).Chronic kidney disease is likely to escalate rapidly over next 2 decades, ( Diabetes Mellitus and Hypertension are increasing at remarkable rates).

Rajiv Gandhi Government General Hospital is one of the biggest hospital in South East Asia with 2,700 + beds and has all the specialties and

super specialties. The Nephrology Department consists of peritoneal dialysis unit, haemodialysis unit, and pre and post operative ward. It is well equipped unit. Regular renal transplantation programme was started in the hospital in July 1987. 809 transplants were done till 31.05.2009, of which 23 were cadaver donor. Regular out-patient and in-patient care with lab investigations and periodic follow-up done.

About 3500 to 4000 new patients are seen annually in Rajiv Gandhi Government General Hospital, Chennai-3. About 200 to 300 have Acute Renal Failure, they are dialyzed till recovery. Around 500 to 600 patients have varying degrees of Chronic Renal Failure. They are investigated and treated by peritoneal dialysis or haemodialysis. 24 hours Peritoneal Dialysis and Haemodialysis done for the patients in our hospital.

***Table – 1: Statistical report of Nephrology Department, Rajiv Gandhi Government General Hospital, Chennai-3***

| Departments | 2008 | 2009 | 2010 |
|---|---|---|---|
| In- patient | 12061 | 12034 | 14086 |
| Out- patient | 29391 | 28109 | 30935 |
| Hemodialysis | 4375 | 4612 | 4073 |
| Peritoneal dialysis | 1341 | 1477 | 1563 |
| Kidney transplantation | 49 | 64 | 66 |

**Source: Medical Record Department, Rajiv Gandhi Government General Hospital, Chennai-3**

In recent years, scientific literature has demonstrated numerous improvements in physical, vocational, and emotional outcomes from an intradialytic exercise program for end-stage renal disease patients. Despite documented benefits, most dialysis clinics have not moved to incorporate exercise for their patients. This could be due to many factors including lack of patient interest and/or the lack of information on how to get an exercise program started.

The ***University of Virginia Renal Services*** incorporated an exercise program and has found success with adherence to the program from staff and patients. With proper commitment from the staff, an exercise program for End Stage Renal Disease patients can become a reality and a standard treatment of care for dialysis patients.

Recent study by ***Susan Godfrey (2011)*** revealed, intradialytic exercise programs have gained interest from nephrologists and dialysis clinics across the country. However, exercise for dialysis clinics is still not seen as a standard therapy, even though scientific literature shows positive outcomes for intradialytic exercise.

Research on exercise and dialysis performed for close to three decades has clearly defined dialysis patients are more sedentary than the normal population, further compromising their overall health. ***Painter et al (2007)*** has dedicated a large amount of research showcasing the dramatic benefits of exercise and physical activity, specifically for dialysis patients - that result in cardiovascular improvements in physical functioning, self-reported physical functioning, and quality of life issues.

According to the study conducted by ***Hansen (2005)*** proposed that to relieve an established cramp one must passively stretch the contracting muscle. Prophylactic stretching of the particular muscle can also prevent attacks.

Through out the entire illness the nurses play a crucial role in providing information, support, understanding and therapeutic care to the patients and the family members who care for the patients with kidney disease. Therefore it is essential to provide therapeutic care to the patients who are undergoing haemodialysis.

Thus, the investigator has opted to provide intradialytic stretching exercise prophylactically during haemodialysis session to relieve muscle cramps.

## 1.2. STATEMENT OF THE PROBLEM

"Assess the effectiveness of intradialytic low-intensity stretching exercise on muscle cramps among patients undergoing haemodialysis at Dialysis unit, Rajiv Gandhi Government General Hospital, Chennai-3".

## 1.3. OBJECTIVES

- To assess the characteristics of muscle cramps among control group
- To assess the characteristics of muscle cramps among experimental group after intervention
- To evaluate the effectiveness of intradialytic low-intensity stretching exercises on muscle cramps among experimental group
- To associate the effectiveness of intradialytic low-intensity stretching exercise with selected demographic variables

## 1.4. OPERATIONAL DEFINITION

### *Effectiveness*

In this study it refers to the degree to which objectives are achieved or the ability to produce intended result

### *Intradialytic*

Pertaining to the end of first hour of a four hour haemodialysis session.

### *Low-intensity Stretching exercises*

Flexing the knee joint of the patient and pulling the heel down slowly and simultaneously flex the foot until the patient report a feeling of stretch in the calf region.

### *Muscle Cramps*

It is an involuntarily and forcibly contracted muscle that does not relax. It is due to a muscle spasm which is when a muscle contracts too hard usually occurs in a calf muscle, below and behind a knee.

***Haemodialysis***

The process that involves removing the waste products and excess fluid from the blood by passing it through a machine (dialyser) with a semi permeable filter.

## 1.5. HYPOTHESIS

- Patient receiving intradialytic low-intensity stretching exercise will experience less muscle cramps during dialysis than those who are not.
- Intradialytic low-intensity stretching exercise will reduce the frequency, duration, quality, intensity and muscle tone.

## 1.6. ASSUMPTION

- Patient receiving intradialytic low-intensity stretching exercise experience less muscle cramps.
- Stretching exercises improves perfusion

## 1.7. DELIMITATIONS

- Study sample were limited to the patients who are undergoing haemodialysis
- Study period is limited to four weeks only
- Study setting is limited to Dialysis unit, Rajiv Gandhi Government General Hospital, Chennai-3.

# CHAPTER - II
# REVIEW OF LITERATURE

Review of literature is a step in the development of a research project. It helps the investigator to develop deeper insight into the problem and gain information on problem and on what has been done before. It provides basis for future investigation justified the need for replication, throws light on the feasibility of the study to another with a hope to establish a comprehensive body of scientific knowledge , from which valid and persistent theories may be developed.

An extensive review of literature was done to gain insight into the problem under study and collect maximum information for laying the foundation of the study.

***This chapter presents the related studies and literature as follows***

The reviews of literature are categorized under two headings

- Reviews related to muscle cramps.
- Reviews related to the effectiveness of physical exercises while undergoing haemodialysis.

## 2.1. REVIEWS RELATED TO MUSCLE CRAMPS

***Jansen P.H.P (2009)*** conducted a study on past and current understanding of the pathophysiology of muscle cramps, treatment of leg cramps. Relevant hypotheses on the pathophysiology of muscle cramps are reviewed. Psychosomatic, vascular, myogenic and neural theories are highlighted from a clinician's point of view. Modern neurophysiologic research leaves little doubt that muscle cramp is caused by excitation of spinal motor neurons mediated by changes in presynaptic input. Muscle cramps can last anywhere from a few seconds to a quarter of an hour or occasionally longer. It is not uncommon for a cramp to recur multiple times until it finally goes away. The cramp may involve a part of a muscle, the entire muscle, or several muscles that usually act together. Cramps also may

be experienced in other conditions that feature an unusual distribution of body fluid, weight of fluid removal, electrolytes loss, frequency of dialysis, low potassium levels occasionally cause muscle cramps, although it is more common for low potassium to be associated with muscle cramps.

***Harold I. Feldman, et al (2009)*** studied on the Effects of L-Carnitine on Dialysis-Related Hypotension and Muscle Cramps. A Meta-analysis was done for the adult patients with end-stage renal disease receiving long-term haemodialysis. Random-effects pooled odds ratio for intradialytic cramping or hypotension in L-carnitine–treated participants. Of 317 potentially relevant patients, (total enrollment of 193 patients) met criteria for inclusion.90% of patient reported results for both hypotension and cramps, 46% had results for only hypotension, and 44% reported results for only cramps. Using data from all relevant trials, the pooled odds ratio for cramping after L-carnitine supplementation was 0.30(P = 0.05). Analysis of examining the response of intradialytic hypotension to L-carnitine supplementation yielded a pooled odds ratio of 0.28(P = 0.2). Although suggestive in the case of muscle cramping, the available evidence does not confirm a beneficial effect of L-carnitine supplementation on dialysis-related muscle cramping or intradialytic hypotension.

***Al-Humoud H.Mm, et al (2008)*** conducted a prospective randomized study on the effect of profiled haemodialysis on intradialytic symptoms was undertaken among patients recruited between September 2008 and December 2008 in Churchill Hospital, London. The study evaluated intradialytic symptoms included hypotension, muscle cramps, dizziness, headache, nausea, discomfort, thirst, and shortness of breath. Symptomatic patients were allocated to one mode of combined sodium and ultrafiltration profile during hemodialysis. On standard hemodialysis 40 (36.4%) patients were symptomatic. Hypotension was reported in 29 (72.5%) of patients receiving standard treatment. Muscle cramps were reported in 22 (55%) patients, respectively. These symptoms were significantly (P < .05) improved at 2, 4, and 6weeks of profiling. Other symptoms, such as discomfort, nausea,

vomiting, and thirst, were infrequently reported among patients without or with profiling.

***Siestema, et al (2007)*** conducted a meta- analysis to study 122 patients on maintanence haemodialysis. The study reaveled that peripheral arterial disease was determined by measurement of ankle-brachial index pre and post dialysis in lower extremities. Intradialytic cramps experience was assessed from history, 52.1% patients reported intradialytic cramps. Old age people were only 37.5% and it was inferred that there was no relationship between cramps during dialysis and peripheral arterial disease.

***Jean N. Wanner et al (2007)*** conducted a prospective, randomized trial to determine the cause of leg cramps and knee pains among haemodialysis clients in Turkey. The study proposed that cramps and pains of the lower extremities along with stiffness and pains in the knees are common complaints in the dialysis patients. Because the etiology and development of these disorders are poorly understood, treatment has been haphazard, for the most part unsuccessful, and occasionally dangerous. The popular practice of massaging ,hot applications, exercises plays a vital role. They discussed several simple stretching exercises which mimic the effects and frequently result in immediate and dramatic relief of symptoms of cramps.

***Tuney (2006)*** published that the severe muscle cramps are experienced near the end of dialysis treatment. He suggested to try a program of gentle stretching exercises targeted at the muscles which tend to decrease the cramp during dialysis.

***Shou-Dong Lee, et al (2006)*** conducted a randomized controlled trial of muscle cramps in dialysis patients in Khomeini Hospital. The aim of the study was to evaluate the complications of dialysis in 31 renal patients with muscle cramps were randomly divided into two groups respectively. Baseline clinical and laboratory data for these two groups were similar. Four weeks after the results found were the muscle cramps and hypotension are the two main complications, 14.4 ± 1.7 (mean ± S.E.) to 1.4 ± 1.1 episodes

($p < 0.001$). In addition, 88% of the 16 patients on hypotension and 13% of the 15 patients on muscle cramps showed a greater than 50% reduction in the number of cramps during a 4-week treatment period ($p < 0.001$). There was a significant relationship between hypotension and muscle cramps. No significant adverse effect was observed during the study, except for five (31%) patients who developed mild dizziness, vomiting and head ache. It was concluded that hypotension and muscle cramps are important complication which must be seen for the patients undergoing haemodialysis.

***John K. Leypoldt, et al (2006)*** conducted a study on identifying symptoms- muscle cramps during hemodialysis by continuously monitoring the patients. The study have demonstrated that patients on haemodialysis develop intradialytic symptoms when the blood volume decreases to a critical level. Using a continuous monitor (In-Line Diagnostics, Riverdale) the instantaneous hypotension and blood volume, dizziness and muscle cramps were observed. The ultrafiltration rates were increased 25% above prescribed values at the beginning of the experimental sessions. Subsequently during the experimental sessions, ultrafiltration rates were manipulated. Finally, the patients developed muscle cramps. Sessions without ultrafiltration rate adjustments based on controls. There were no differences between experimental (n = 27) and control (n = 28) sessions with respect to treatment and maximum percentage change in systemic blood pressure and muscle cramps (−26% v −24%). However, there were symptoms like hypotension, muscle cramps and dizziness developed during the experimental sessions (26% v 57%; P = 0.038). These data suggest that intradialytic symptoms can be identified by continuous monitoring without altering treatment times .

***Vanich (2005)*** studied 24 patients with nocturnal calf cramps in Nephrology Committee, Agentine. The subjects were divided in to two groups to quantitatively compare the effect of trigger point injection and oral quinine. The study was conducted for four weeks and followed up after four weeks of the study. Parameters were cramp frequency, duration, pain intensity

and cramp index. Result supported that gastrocnemius trigger point was one cause of nocturnal calf cramps.

***Tonge (2005)*** studied an alcoholic poly neuropathy sequential spreading of cramps from unilateral to contralateral leg muscles and phasic discharges observed by needle electromyography. He inferred that sensory inputs from peripheral nerves played a critical role in the generation of muscle cramps during haemodialysis session.

***Naylor and young (2005)*** surveyed a population of 218 patients and found that the overall prevalence of muscle cramps was 37% and most commoly experienced in the muscle of the leg in 83% of cramps sufferer.

***Dial (2004)*** conducted a randomized control trial on 46 complete dialysis treatment sessions patients. Electromyographic activity was recorded from a leg muscle in patients who had cramps. Results indicated that the mean muscle cramp latency from start of dialysis was 248 minutes and average cramp was 10 minutes in duration. Also tonic electromyographic activity in patient with muscle cramps showed a continued increased throughout the latter part of dialysis. They suggested that increase in electromyographic activity might be casually related to muscle cramps.

## LITERATURE RELATED TO THE EFFECTIVENESS OF INTRADIALYTIC EXERCISES DURING HAEMODIALYSIS SESSIONS

***Fabrice A Giordano (2010)*** conducted a randomized controlled trials in testing the effects of exercise in dialysis patients. They tested the feasibility of a supervised intradialytic resistance band exercise training program, and its effects on physical function. A total of 11 unselected adult patients from the center, aged 70+(10.7) years, including 8 men and 3 women, accepted to follow the program under the supervision of qualified physiotherapists. Thirty-six exercise sessions of moderate intensity (twice a week, mean duration 40 minutes each) mainly involving leg muscles against an elastic resistance, were performed. The exercise program was well tolerated and all patients completed it. Statistically significant improvements were

observed in the following test (P = .022) . the result revealed improvements in the six minute walk distance and in the one-leg balance tests reached statistical significance.

***Joline LT Chen (2010)*** conducted a performance testing on the effects of exercise during haemodialysis on physical performance and nutritional assessment. In an outpatient setting 130 patients were selected for the study and exercise programme including cycling, walking, stretching, light weight exercise were implemented. Each intervention given for 60 seconds. Patients chart were reviewed for episodes of intradialytic cramping. The result shows that all the patients showed improvement of physical performance at 3 months( p=0.05) , at (p=0.02). Thus, they concluded that a formal intradialytic exercise regimen can improve the physical performance.

***Sue-Yueh Cheng (2010)*** conducted a quasi-experimental study to evaluate the effect of intradialytic leg ergometry exercise for improving fatigue and daily physical activity levels among chronic kidney disease patients. Two hemodialysis units in a Medical Center in Northern Taiwan. The leg ergometry exercise was performed within the first hour of each hemodialysis session for 30 min for 8 weeks. There were 36 subjects in the experimental group and 35 subjects in the control group who completed the study. Measurement on a fatigue scale and a physical activity log were done at the time of enrollment, and again on the fourth and eighth weeks. Active subjects demonstrated significantly less fatigue and higher physical activity levels than those with a sedentary lifestyle at baseline.The experimental group demonstrated an increase in activity levels. The 36 subjects performed 3456 leg ergometry exercise sessions with three early terminations (<.01%) among the sedentary subjects. Intradialytic leg ergometry is a safe exercise that is effective to reduce fatigue and improve physical fitness in already active chronic kidney disease patients and it also reduces fatigue in sedentary patients.

***Kirsten P Koh (2009)*** performed a randomized, controlled clinical trial to compare the effect of supervised intradialytic with unsupervised home-based exercise training on physical function. A total of 72 heamodialysis patients randomized to receive either six months of intradialytic exercise training, home-based exercise training or usual care. Intradialytic patients will undergo three training sessions per week on a cycle and home-based patients will be provided with a walking

program to achieve the same weekly physical activity. The outcome measures were made at baseline, three and six months. The results of this study determined the efficacy of intradialytic exercise training in hemodialysis patients.

***Dan Bayliss (2009)*** performed a systemic review in starting and managing an intradialytic exercise program for end stage renal disease patients can become a reality and a standard treatment of care for dialysis patients. The goal of this article is to define the components needed to begin and manage an effective intradialytic exercise program. This article describes how the University of Virginia Renal Services incorporated an exercise program and has found success with adherence to the program from staff and patients. Patients are encouraged to exercise at least 12 days during that month (out of a possible 13 or 14 dialysis days for patients that run 3 dialysis sessions per week). With proper commitment from administration and staff, an exercise program for acute renal failure patients can become a reality and a standard treatment of care for dialysis patients. Intradialytic exercise programs are important to enhance patient physical functioning, exercise capacity, and improve overall health. Finally this became a standard treatment for all dialysis units in University of Virginia Renal Services.

***Samuele M Marcora (2009)*** performed a new approach on haemodialysis patients who are characterized by muscle wasting and consequently decreased physical functioning and poor outcome. Although this novel exercise programme, utilizing high intensity interval training was safe, clinically feasible and beneficial in terms of physical functioning. The 12 weeks of intradialytic exercise programme was beneficiary for the patients treated in a community-based hospital,Taipei. The result revealed that exercising patients have shown improvements in physical fitness and psychological function.

***Maria Takhreem (2008)*** This review aims to critically examine the effect of exercise prescription in reducing the physical and psychological limitations encountered by dialysis patients. Four studies were selected and critically appraised using specific inclusion criteria. The results of all studies

suggest a causal relationship between exercise intervention and quality of life in renal patients. Exercising patients have shown improvements in physical fitness, psychological function, manual dexterity, reaction times, and lower-extremity muscle strength. All of these factors help improve quality of life. Evidence gathered from the studies shows that exercise training has beneficial effects on the quality of life of chronic renal patients; however, exercise is still not routinely prescribed. Further research and robust evidence are needed to overcome the limitations encountered by previous studies to confirm the positive results of exercise prescription in management of chronic renal failure patients.

***Mareland, et al (2008)*** conducted a single blind randomized placebo controlled trial on the background of individuals with end stage renal disease on haemodialysis therapy had reduced aerobic exercise capacity and muscle strength. They had proposed an exercise intervention in haemodialysis patients. It consisted of programic resisted isotonic quadriceps and harvesting exercise and training on a cycle ergometer weekly thrice for 12 weeks. They inferred that the exercise program improved physical impairment measures.

***Susan Godfrey, et al (2007)*** conducted a randomized pilot trial on 50 participants receiving long term haemodialysis. Intradialytic low-intensity strength training or stretching exercise given twice weekly for a total of 48 exercise session. The result showed that 57% participants experienced effective of the intervention and showed significant improvement from baseline score (P=0.02). the result was concluded that intradialytic low-intensity progressive strength training was safe and effective among maintanence haemodialysis patients.

***Coppin (2006)*** quoted an uncontrolled study which suggested that calf- stretching exercises could prevent nocturnal leg cramp in patients with long term dialysis treatment. It reduces the occurrence of leg cramps during dialysis session.

***Kannan (2005)*** recommended a non- pharmacological approach of stretching and massaging as the first line treatment for idiopathic nocturnal leg cramps.

***Lee (2005)*** quoted in Dialysis and Transplantation Journal that in a specify study involving 140 haemodialysis treatment on 103 patients the cumulative incidence of cramps was established to be 86%. Since cramps are common intradialytic event, the discomfort leads to premature termination of the treatment. He stated that massage and vigorous stretching of the cramped muscle would cause the spasm to yield in haemodialysis patients.

***Hansen (2005)*** published a treatment protocol for cramps in end stage renal disease which concluded that to relieve an established cramps, one must passively stretch the contracting muscle. In some cases, this could be accomplished by simply walking around which produced a relative dorsiflexion of foot. Prophylactic stretching can also prevent cramps attacks.

***Naylor JR (2005)*** conducted a quasi-experimental trial to evaluate the effectiveness of intradialytic exercise programme resistance training for maintanence haemodialysis patients. The goal of the study is to investigate the effect of the study is to investigate the effect of a 12 week progressive reistance training during haemodialysis. It was hypothesized, based on previous literature involving similar resistance training protocols. The results showed that there was significant increase in muscle wasting quantity as well as physical fitness.

***Sawelson et al (2005)*** conducted a prospective randomized control trial on 12 maintanance haemodialysis patients by providing them incremental and constant work rate cycle exercise for 6-8 weeks. The result revealed that eight weeks of leg exercise during haemodialysis in maintenance patients improves not only cardio pulmonary fitness and endurance but also muscle strength, muscle power, fatigability and physical function.

***Farrington (2004)*** studied two groups of 10 patients in each by exercising them submaximally using a stationary cycle during isovolemic

dialysis for 10 minutes of exercise. Cardiac output, peripheral resistance, blood volume and stroke volume were measured using ultrasound dilution and concluded that the hemodynamic response to exercise during haemodialysis is comparable with that in normal individuals.

***Normanno et al (2004)*** performed a study in eight patients who participated in physical training with motorized cycle during dialysis treatment. The study suggested that exercises during dialysis treatment was safe and consented either better psychosocial performance or better dialytic efficiency.

***Paul S Little (2004***) conducted a randomized controlled trial to assess the effect of calf stretching exercises and cessation of quinine treatment for patient with night cramps. The study was conducted in Southern England. 191 patients prescribed with quinine were randomized and defined by two advice factors- undertake exercise and stop quinine treatment. After 6 weeks of intervention the results confirms that regular calf stretching exercise was an effective intervention in reducing the frequency, severity of leg cramps.

***Schroeder (2004)*** studied 32 haemodialysis patients who participated in a progressive self paced exercise programme including cycling before or during haemodialysis or walking on treadmill before dialysis. Patients also had the option of doing stretching and light weight exercise during haemodialysis. They were assessed after a duration of 3,6 and 12 months of participation for physical strength, weight, blood pressure, electrolytes, haematocrit, glucose and intradialytic cramping. Results showed that all patients had improvement in measures of physical performance.

***Ballagh (2004),*** conducted a quasi experimental one group pre and post test design study. Eight subjects completed a 12 week exercise programme involving warm-up, stretching, strengthening and cardiovascular training. The results demonstrated improvements in participant physical capacity, quality of life and ability to perform activities of daily living. They concluded that an exercise during dialysis programme was safe and had the potential to result in positive patient outcomes.

***Sontag (2004)*** hypothesized that cramps are caused by muscle and tendon shortening. He had discussed several simple stretching exercises which mimic the effect of squatting that frequently resulted in immediate and dramatic relief of cramps.

***Schwellneus (2003)*** described that during muscle cramps, electromyographic activity was high and passive stretching was effective in reducing this. Stretching relieved cramp by probably invoking the inverse stretch reflex. Stretching also invoked afferent activity from golgi- tendon organ to relieve cramps.

***Lec Mc Gee (2003)*** emphasized that mechanical treatment of an acute muscle cramps involved stretching the affected muscle and this could be done prophylactically also. The study reviewed that treatments for leg cramps included stretching exercises, qunine and vitamin E. He also proposed that the best evidence supported stretching exercises for ordinary muscle cramps. He also proposed for future study areas of this common symptoms.

## 2.2. CONCEPTUAL FRAMEWORK BASED ON WEIDNENBACH'S HELPING ART OF CLINICAL NURSING THEORY

Conceptual frame work is a theoretical approach to the study problems that are scientifically based, which emphasizes the selection, arrangement and classification of its concepts. It represents the measurement on which purposes of the proposed study is based.

The study is based on the concept that intradialytic stretching exercise reduces the intensity, frequency, duration, quality and muscle tone when the muscle cramps occur during the haemodialysis cycle.

The conceptual frame work used for the study was derived from Weidnenbach's helping art of clinical nursing theory (1964). According to Weidnenbach's, nursing practice is an art in which the nursing action is distinct kinds of actions. This theory views nursing as an art based on a central purpose. This theory proposes that nursing practice has three components such as

- ❖ Identification
- ❖ Ministration
- ❖ Validation

This theory views nursing as an art based on a central purpose. It consists of three factors: central purpose, prescription and realities. Central purpose refers to the goal towards which the nurse strives. In this study the main central purpose is to assess the effectiveness of intradialytic low-intensity stretching exercise on muscle cramps among patients undergoing haemodialysis.

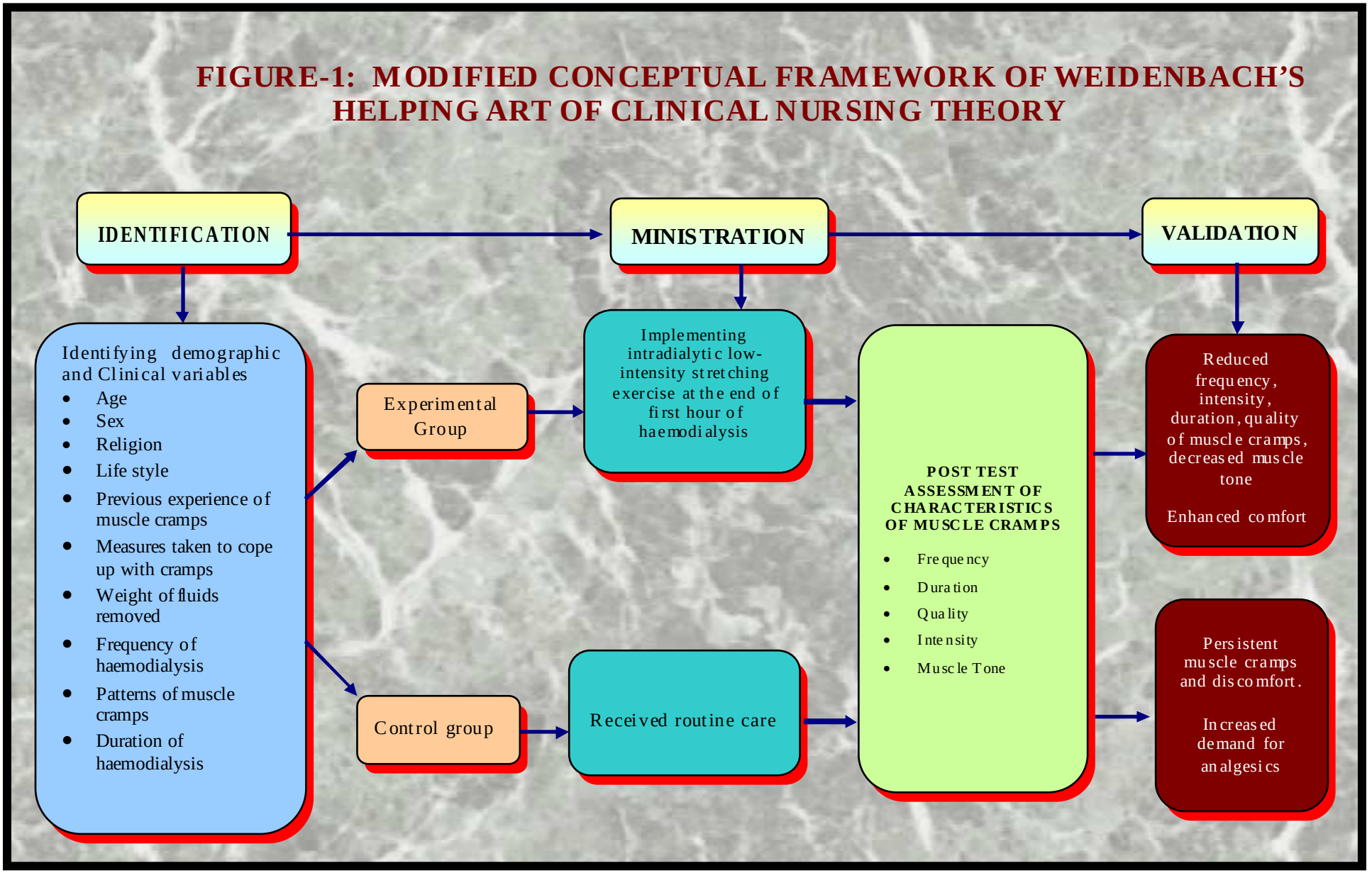
First component is to identify the demographic variables. The researcher observes the patient and identifies the need for help by selecting the samples based on criteria for sample selection. She determines the cause of the discomfort identifies the risk for muscle cramps and ascertains from

patient's experience and it is evidenced through nurse-patient interaction. The researcher notices the patient behavior like verbal expression of previous experience of muscle cramps, his frequent position changes in bed and worried facial expressions during haemodialysis. The researcher also identifies possible risk factors for developing muscle cramps as high amount of fluid removal, increase duration of haemodialysis, repeated use of dialysis, frequency of dialysis. Finally, she validates with the patient that the health is needed.

The second component is ministration. The researcher meets the needs of the patient by ministering respective intervention. she acts by planning and implementing calf stretching exercises to prevent muscle cramps. In this study implementing the intradialytic low-intensity stretching exercise done for the experimental group whereas the control group receives the routine care. Finally the planned intervention is implemented to alleviate the distress of the patient.

The third component is validation. After help has been administered, the researcher validates that the action were indeed helpful. Evidence must come from the patient from the purpose of the nursing actions has been fulfilled. In validating the need for help, it was met. The researcher validated the ministered help by comparing the frequency, duration, quality, intensity and muscle tone in both the experimental and control group.

## FIGURE-1: MODIFIED CONCEPTUAL FRAMEWORK OF WEIDENBACH'S HELPING ART OF CLINICAL NURSING THEORY



# CHAPTER – III
# RESEARCH METHODOLOGY

Research methodology is a systematic procedure which the researcher starts from the initial identification of the problem to its final conclusions. The role of methodology consists of procedures and techniques for conducting the study. The purpose of this section is to communicate to the readers what the investigator did to solve the research problem as to answer the research questions.

This chapter deals with the description of research and the methodology adopted in the study. It is discussed under the following headings research approach, research design, setting, population, sample and sampling technique, pilot study, development and description of the instruments, procedure for data collection and plan for data analysis.

The present study was aimed at assessing the effectiveness of intradialytic low- intensity stretching exercise on muscle cramps among patients undergoing haemodialysis at Dialysis unit, Rajiv Gandhi Government General Hospital, Chennai-3.

## 3.1. RESEARCH APPROACH

The selection of research approach is the basic procedure for conducting the research. The approach used in this study was quantitative approach. This was considered to be the most appropriate to achieve the objectives of the study.

## 3.2. RESEARCH DESIGN

The research design explicit blue print for research activities to be carried out. Research design helps the researcher in selection of subjects, identification of variables, their manipulation and control.

The research design selected for the present study is true experimental design - post test only control group design which comprises of random, control and manipulation.

It could be represented as-

**E - X $O_1$ $O_2$ $O_3$**

**C - $O_1$ $O_2$ $O_3$**

**KEY WORDS**

E - Experimental group

C - Control group

X - Intervention

$O_1$ - Observation at the end of second hour

$O_2$ - Observation at the end of third hour

$O_3$ - Observation at the end of fourth hour

**EXPERIMENTAL GROUP**

The intradialytic low- intensity stretching exercise given for the patients under experimental group along with routine care.

**CONTROL GROUP**

To abide the ethical principles routine treatment given for control group as prescribed and permitted.

## 3.3. VARIABLES

Independent variable in this study is intradialytic low-intensity stretching exercise and dependent variable is muscle cramp.

## 3.4. SETTING OF THE STUDY

The study was conducted at Dialysis unit, Department of Nephrology, Rajiv Gandhi Government General Hospital, Chennai – 600 003. It is one of the biggest hospital in South East Asia with 2,700 + beds and has all the specialties and super specialities. It is an educational and research institute as well as a referral hospital. The Nephrology Department consists of peritoneal

dialysis unit, haemodialysis unit, and pre and post operative ward. Its well equipped unit. Regular renal transplantation programme was started in the hospital in July 1987. Around 809 transplants were done till 31.05.2009, of which 23 were cadaver donor. Regular out-patient and in-patient care with lab investigations and periodic follow-up done. The dialysis unit is well equiped with dialysis machine, all emergency equipments and medicines with nearly 15 beds.

## 3.5. POPULATION

The population is defined as the entire aggregation of cases that meet a designated set of criteria. In the present study the population consists of all the clients with the age group of 20- 70 years who are undergoing haemodialysis in Dialysis unit, Department of Nephrology, Rajiv Gandhi Government General Hospital, Chennai-3. There are approximately 15- 20 clients who undergo haemodialysis every day and 60- 70 patients diagnosed with acute renal failure visits out patient department for treatment per day.

## 3.6. SAMPLE SIZE

The sample comprises of 80 adult patients who are undergoing haemodialysis, 40 patients in control group and 40 patients in experimental group.

## 3.7. SAMPLING TECHNIQUE

Sampling technique is an important step in the research process. It is the process of selecting representative units or subsets of a population of the study in a research. Simple random sampling technique- lottery method was used to select the sample.

## 3.8. CRITERIA FOR SAMPLE SELECTION

The criteria for sample selection are mainly depicted under two headings, which includes the inclusion and the exclusion criteria.

### *Inclusion criteria*

- Patients with age group of 20-70 years

- Patients who are able to communicate in tamil and english
- Patients who sustains stable dialysis treatment
- Patients with no musculoskeletal impairments
- Patients who are willing to participate

### *Exclusion criteria*

- Emergency haemodialysis patients
- Patients with femoral catheter
- Patients with lower limb pathology
- Patients who are haemodynamically unstable during dialysis treatment
- Patient with concurrent medical conditions that may contraindicate exercise

## 3.9. DEVELOPMENT AND DESCRIPTION OF THE TOOL

In order to gather data on demographic and clinical variables a structured interview schedule was used. The characteristics of muscle cramps is assessed by five items. It is considered to be most appropriate instrument. The tool was prepared after reviewing of many literatures.

### *Format of the questionnaire*

The following tool is used to assess the effectiveness of intradialytic low- intensity stretching exercise.

### *Section A*

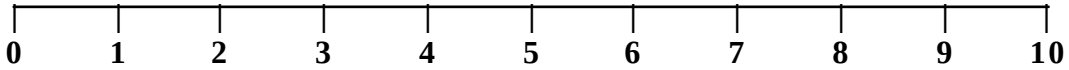
It reveals the information about the demographic variables of haemodialysis patients like age, sex, religion, life style and clinical variables like previous experience of muscle cramps, measures taken to cope up with muscle cramps, weight of fluid removed during haemodialysis, frequency of haemodialysis per week, patterns of muscle cramps, duration of haemodialysis.

***Section B***

This section reveals the characteristics of muscle cramps which included five items- frequency, intensity, quality, intensity of muscle cramps and muscle tone assessment.

(To assess the intensity, modified numerical intensity scale has been used)

Numerical cramp intensity scale




It consists of 10 point numerical intensity scale that was used to assess the intensity of cramps. The scale comprised of a horizontal line with 0- 10 numbers. The score '0' indicates no cramps and the score '10' indicates worst possible cramp. The scale was shown to patients at the end of $2^{nd}$, $3^{rd}$, $4^{th}$ hour after the intervention and the results were noted.

Scoring technique: Total score = 20

The questionnaire consisted of 5 questions with respective score for each options. It is categorized as follows-

| **OPTIONS** | **CRITERIA** | **SCORE** |
|---|---|---|
| Opinion a | Normal | 1 |
| Opinion b | Mild | 2 |
| Opinion c | Moderate | 3 |
| Opinion d | Severe | 4 |

***Characteristics of cramps is differentiated in to***

Mild cramps - (< 8)

Moderate cramps - (9-14)

Severe cramps - (15- 20)

## 3.10. TESTING OF THE TOOL

### *Content Validity*

Validity refers to the degree to which an instrument measures what it is supposed to measure. Content validity refers to the degree to which the items in an instrument adequately represent the universe of content.

The prepared semi structured questionnaire was given along with objectives, hypothesis and methodology were submitted to three experts, which includes two nursing professors and one medical expert to establish content validity.

### *Reliability*

After pilot study, reliability of the tool was assessed by using split half method. Muscle cramp score reliability correlation coefficient value is 0.85. This correlation coefficient is very high and it is good tool for assessing effectiveness of effectiveness of intradialytic low-intensity stretching exercise on muscle cramps among patients undergoing haemodialysis at dialysis unit.

## 3.11. PILOT STUDY

Pilot study is a small scale version or a trial run for the main study to test the practicability, appropriateness and feasibility of both the study and the stool.

Formal approval was obtained from the Professor and Head of the Department, Department of Nephrology, for the pilot study and main study. After obtaining informed consent from the patients the investigator conducted the pilot study by selecting 10 samples by using random sampling method. The investigator collected the information from the samples and the intra dialytic low-intensity stretching exercise was provided to the clients and the effectiveness was seen at the end of fourth hour. The pilot study has helped the investigator to plan the exercise schedule at the end of first hour instead of doing at the end of second hour. It helped to change the study design as post test only control group design. The questionnaire were modified and finalized based upon the experience gained during the pilot study and was

useful in planning and organizing the main study. The study was found to be feasible and the findings showed a tendency towards significance.

## 3.12. DATA COLLECTION PROCEDURE

The investigator initially established rapport with the patients. The purpose of the study ,type of intervention, data collection method were explained to them and written consent was obtained from the patients who are interested and willing to participate. The patients who met the inclusion criteria were selected and randomized. The lottery method was used for sample selection. The samples were numbered and written in slips of paper, shuffled and kept. The slips were taken one after the other and every altenative slips were considered as control and experimental group.

Each patients was interviewed to gather clinical profile before the haemodialysis began. At the end of the first hour, stretching exercise for calf muscle were employed along with the ward routine treatment for experimental group prophylactically ensuring privacy.

Initially, the patient was allowed to bend and extend the lower limbs for warming up. The investigator supports the flexed knee joint of the patient and pulls the heel down slowly and flex the foot simultaneously with her inner fore arm- till the patient report a feeling of stretch in the calf region. Then release the support of knee joint. Slowly push the knee joint down from the flexed position till it is flat. Maintain the stretch for 30 seconds and slowly released. This was repeated for three times with rest in between. The exercise is employed for both legs. The average time taken for exercise was 10-15minutes.

On the other hand control group received routine management as per the protocols and only their post test assessment was done.

During the next three hours the characteristics of muscle cramps was assessed hourly. The intensity was rated in numbers as figured by the clients on the numerical intensity scale. Frequency, duration, quality and muscle tone assessment were noted each time as described by the patients. The

intervention was repeated three times per week for the same patients as a follow up care on alternative days.

## 3.13. PLAN FOR DATA ANALYSIS

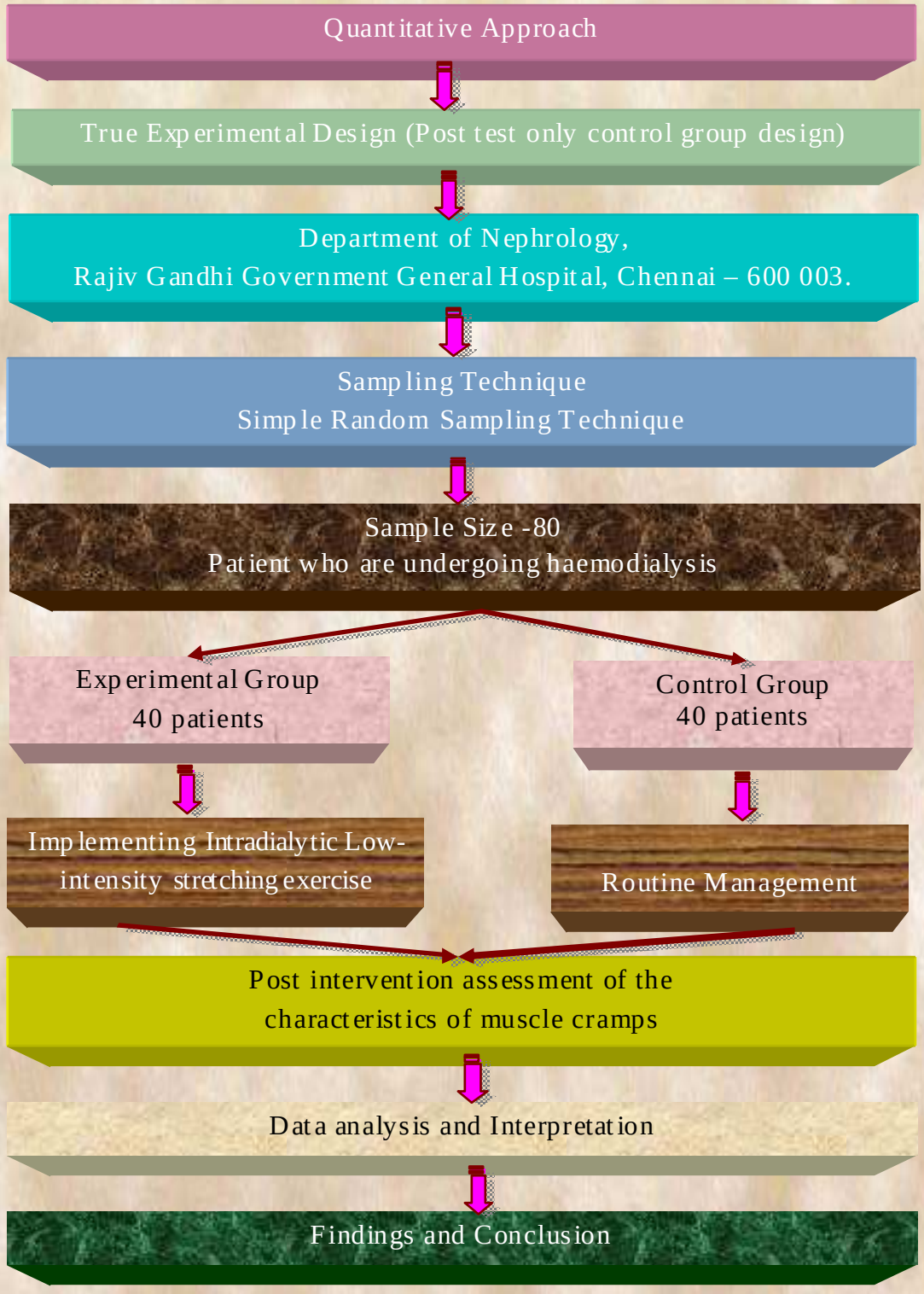
Descriptive statistics – meant for demographic data and clinical profile

Inferential statistics – meant to compare the level of muscle cramps, to find the effectiveness of intervention and to associate the post test level of muscles cramps with the demographic variable in experimental and control groups.

## 3.14. PROTECTION OF HUMAN SUBJECTS

The research proposal was approved by the experts and permission for the study was obtained from the Professor and Head of the Department, Department of Nephrology, Rajiv Gandhi Government General Hospital, Chennai -3. Ethical clearance was obtained from the Institutional Ethical Committee. An informed consent was obtained from each study patient before starting the data collection and doing the intervention. Assurance was given to the patients that confidentiality and privacy would be maintained.

## FIG-2: SCHEMATIC REPRESENTATION OF RESEARCH METHODOLOGY



# CHAPTER – IV
# DATA ANALYSIS AND INTERPRETATION

This chapter deals with the analysis and interpretation of the data collected from 80 patients who underwent haemodialysis, to assess the effectiveness of intradialytic low-intensity stretching exercise on muscle cramps among patients undergoing haemodialysis at Dialysis unit, Rajiv Gandhi Government General Hospital, Chennai-3.

The purpose of analysis is to reduce the data to an interpretable form so that the relation of research can be studied. The data collected from haemodialysis clients with the help of structured interview schedule was organized and analyzed and interpreted by using descriptive and inferential statistics. The data collection was based on the objectives of the study.

***The data has been organized and presented in five sections***

- **Section A:** Description of demographic profile in experimental and control group
- **Section B:** Assessment of the characteristics of muscle cramps among control group
- **Section C:** Assessment of the characteristics of muscle cramps among experimental group after intervention
- **Section D:** Compare the post test level of muscle cramps between experimental and control group
- **Section E:** Associate the effectiveness of intradialytic low-intensity stretching exercise with selected demographic variables

# SECTION-A

***Table-2: Frequency and percentage distribution of patients demographic profile and clinical profile***

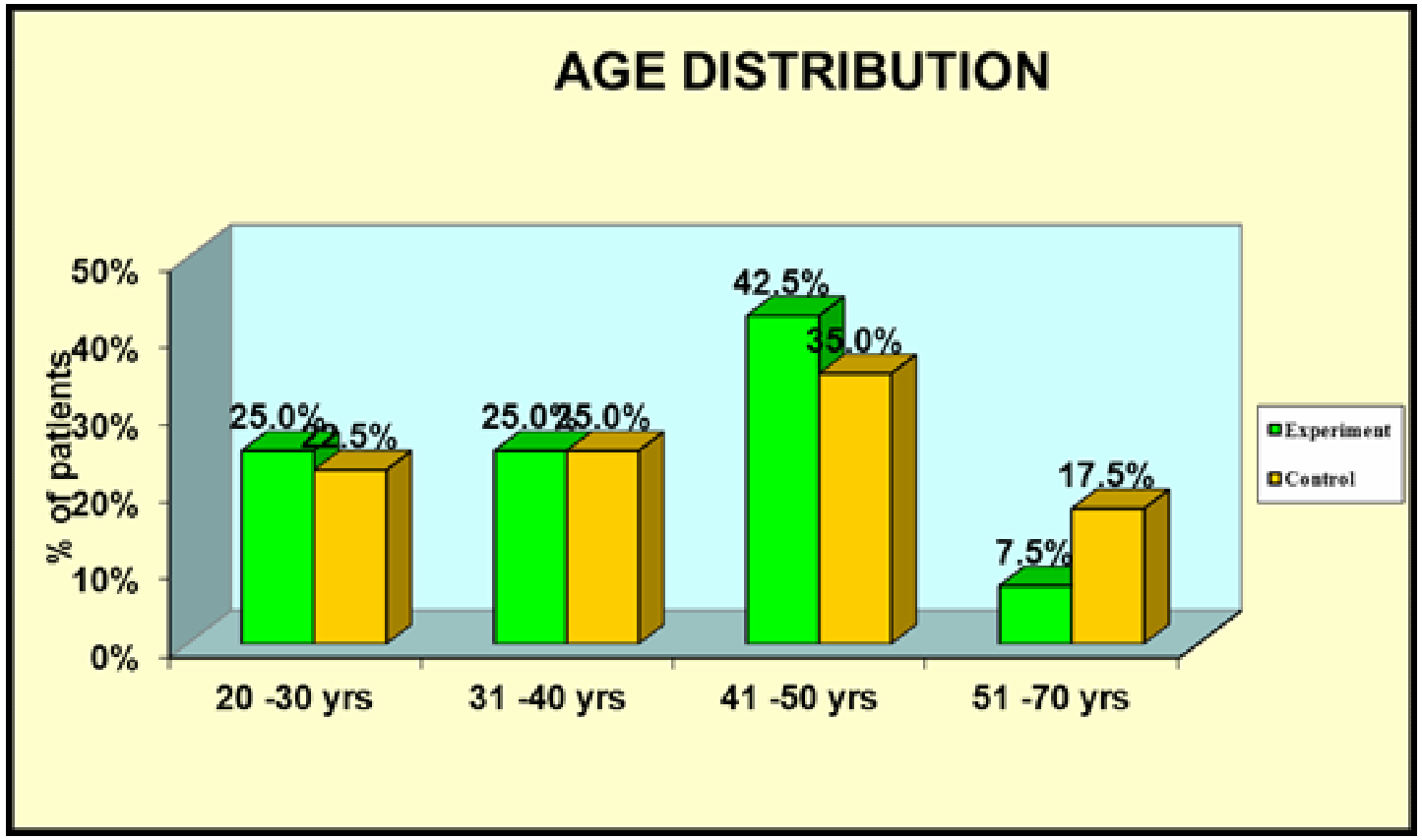
| Demographic variables | | Group | | | |
|---|---|---|---|---|---|
| | | Experiment | | Control | |
| | | n | % | n | % |
| Age | 20 -30 yrs | 10 | 25.0% | 9 | 22.5% |
| | 31 -40 yrs | 10 | 25.0% | 10 | 25.0% |
| | 41 -50 yrs | 17 | 42.5% | 14 | 35.0% |
| | 51 -70 yrs | 3 | 7.5% | 7 | 17.5% |
| Sex | Male | 33 | 82 % | 33 | 82 % |
| | Female | 7 | 18 % | 7 | 18 % |
| Religion | Hindu | 30 | 75.0% | 27 | 67.5% |
| | Muslim | 5 | 12.5% | 4 | 10.0% |
| | Christian | 5 | 12.5% | 9 | 22.5% |
| Life Style | Active | 5 | 12.5% | 6 | 15.0% |
| | Limited Activity | 15 | 37.5% | 10 | 25.0% |
| | Sedentary | 20 | 50.0% | 24 | 60.0% |
| Previous experience of muscle cramps | Yes | 33 | 82.5% | 33 | 82.5% |
| | No | 7 | 17.5% | 7 | 17.5% |
| Measures taken to cope up with muscle cramps | Walking | 5 | 12.5% | 6 | 15.0% |
| | Massaging | 7 | 17.5% | 9 | 22.5% |
| | Hot / Cold application | 18 | 45.0% | 12 | 30.0% |
| | Medications | 7 | 17.5% | 9 | 22.5% |
| | Others | 3 | 7.5% | 4 | 10.0% |
| Weight of Fluid | 2 - 3 liters | 11 | 27.5% | 10 | 25.0% |
| | 3 - 4 liters | 29 | 72.5% | 30 | 75.0% |

| Demographic variables | | Group | | | |
|---|---|---|---|---|---|
| | | Experiment | | Control | |
| | | n | % | n | % |
| Frequency of Dialysis | Twice | 4 | 10.0% | 8 | 20.0% |
| | Thrice | 36 | 90.0% | 32 | 80.0% |
| Patterns of muscle cramps | Constant | 25 | 62.5% | 19 | 47.5% |
| | Intermittent | 15 | 37.5% | 21 | 52.5% |
| Duration of dialysis | > 3 months | 26 | 65.0% | 21 | 52.5% |
| | < 3 months | 14 | 35.0% | 19 | 47.5% |

The above figure depicts that demographic characteristics of 80 patients who participated in the study were described in terms of frequency percentage. Among 17(42.5%) in experimental group and 14(35%) in control group were in the age group of 41-50 years and nearly 33(82%) were male in both the group. Nearly 33(82.5%) in both the groups had previous experience of muscle cramps. 36(90%) in the experimental group and 32(80%) in control cramps were undergoing haemodialysis thrice a week.

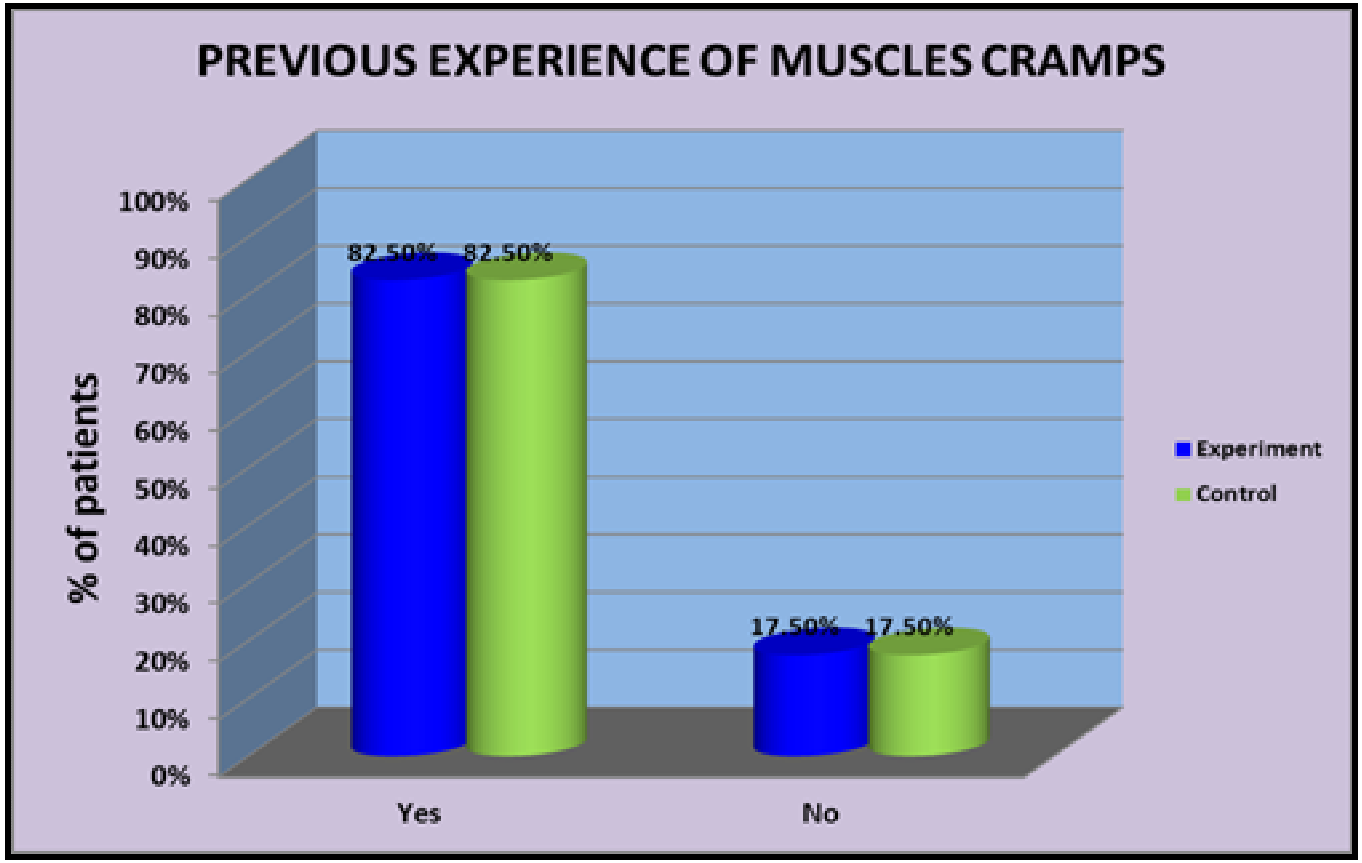
Nearly 30(75%) of the clients in both the groups, the weight of the fluid removal during haemodialysis is 3-4 litres. 25(62.5%) in the experimental group and 19(47.5%0 in control group client were having constant muscle cramps through out the haemodialysis session. Nearly 26(65%) of them in experimental group, 21(52.5%) in control group were undergoing haemodialysis for more than three months.

***Figure 3: Distribution of patients with regard to age***



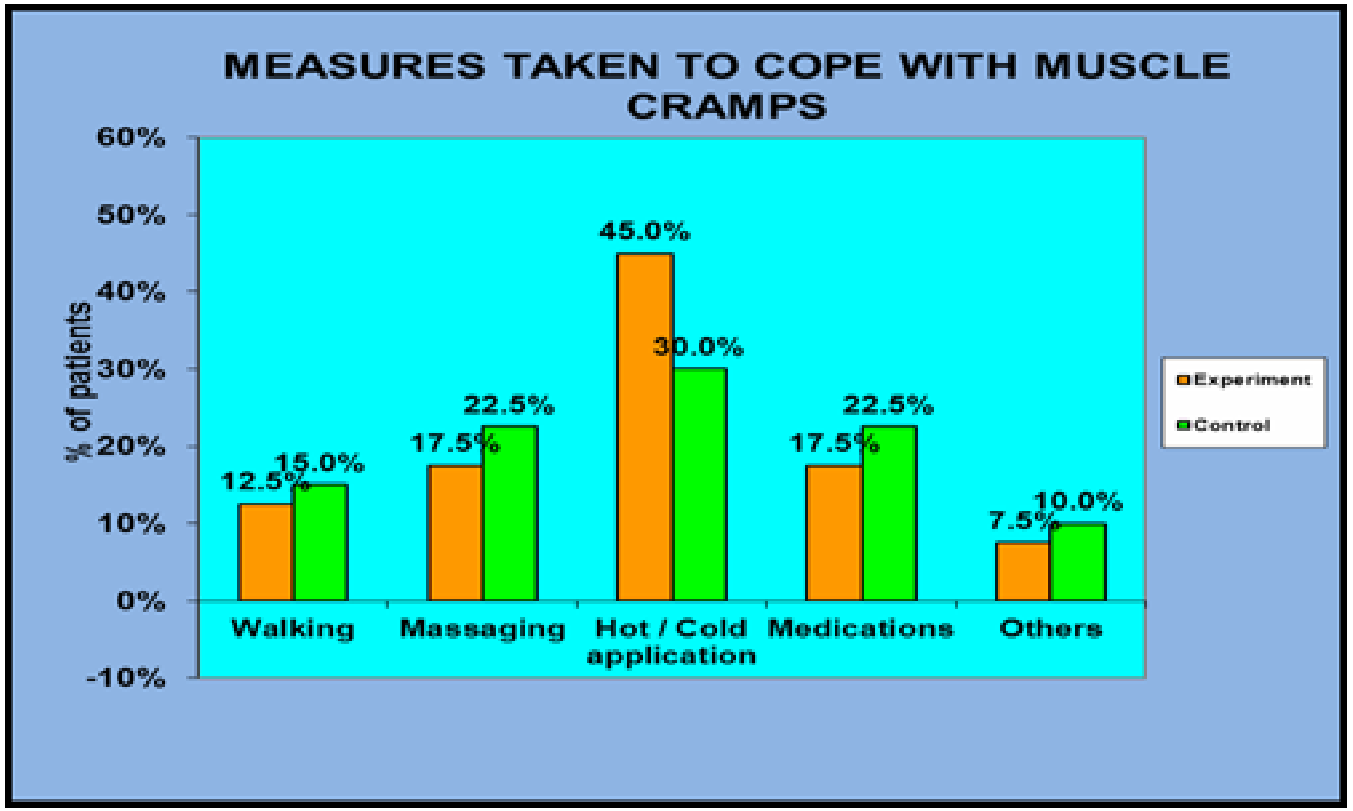

Above figure shows that majority of the patients undergoing haemodialysis were in the age group of 41-50 years in experimental group 17 (42.5%) and control group 14 (35%).

***Figure-4: Distribution of patients with regard to previous experience of muscle cramps***



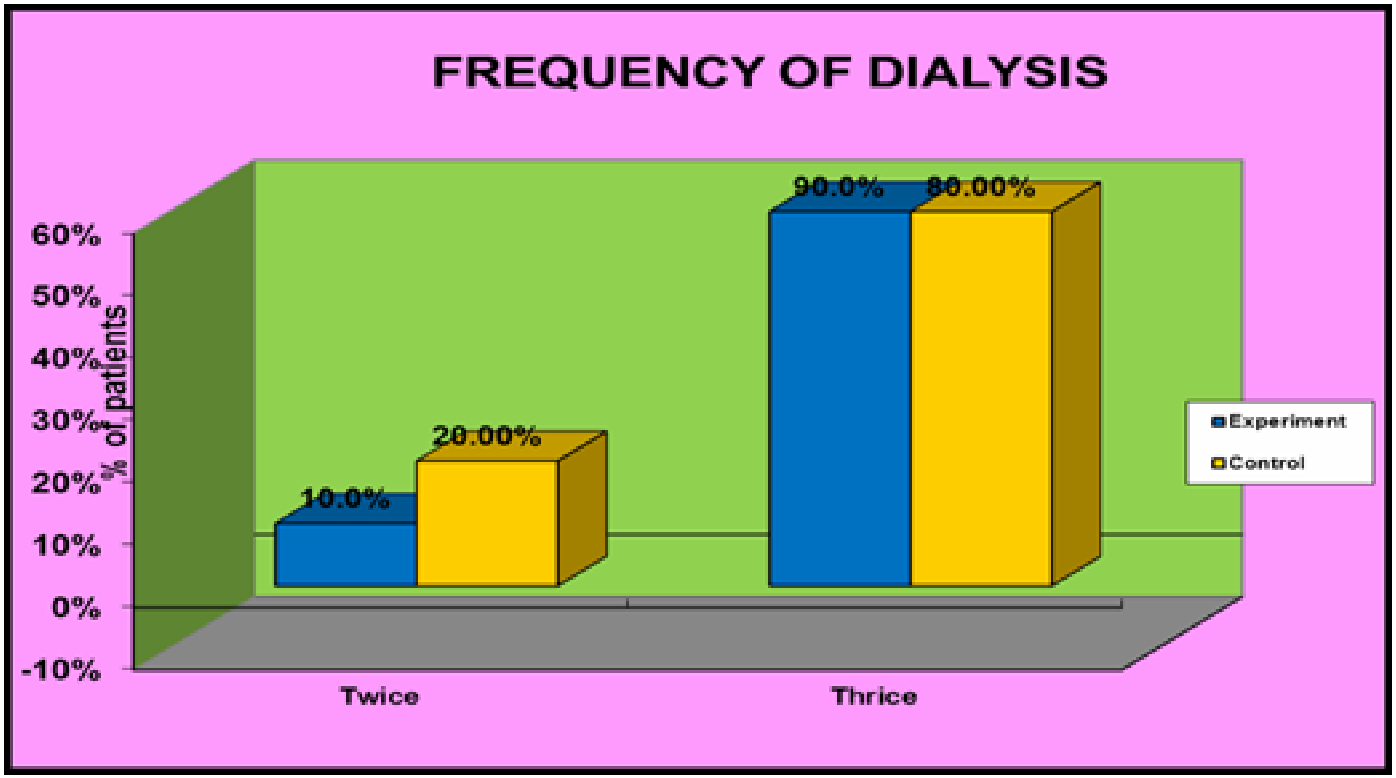

The above figure shows that majority of the patients undergoing haemodialysis 33 (82.5%) in both the groups had previous experience of muscle cramps.

***Figure-5: Distribution of patients with regards to measures taken to cope with muscle cramps***




The above figure shows that majority of the patients in experimental group 18(45%) and control group12 (30%) takes hot/ cold application to cope up with muscle cramps.

***Figure-6:Distribution of patients with regards to frequency of dialysis***




The above diagram depicts experimental group 36 (90%) and control group 32 (80%) are undergoing haemodialysis thrice a week.

# SECTION –B

***TABLE-3: LEVEL OF MUSCLE CRAMPS AMONG CONTROL GROUP***

| Day | Time duration | Level of muscle cramps | Control group | |
|---|---|---|---|---|
| | | | n | % |
| Day1 | 2 hrs | Moderate | 34 | 85.0% |
| | | Severe | 6 | 15.0% |
| | 3 hrs | Moderate | 34 | 85.0% |
| | | Severe | 6 | 15.0% |
| | 4 hrs | Mild | 0 | 0.0% |
| | | Moderate | 38 | 95.0% |
| | | Severe | 2 | 5.0% |
| Day2 | 2 hrs | Moderate | 38 | 95.0% |
| | | Severe | 2 | 5.0% |
| | 3 hrs | Mild | 1 | 2.5% |
| | | Moderate | 36 | 90.0% |
| | | Severe | 3 | 7.5% |
| | 4 hrs | Mild | 3 | 7.5% |
| | | Moderate | 37 | 92.5% |
| Day3 | 2 hrs | Mild | 2 | 5.0% |
| | | Moderate | 38 | 95.0% |
| | 3 hrs | Mild | 3 | 7.5% |
| | | Moderate | 34 | 85 % |
| | | Severe | 3 | 7.5 |
| | 4 hrs | Mild | 2 | 5% |
| | | Moderate | 36 | 90% |
| | | Severe | 2 | 5% |

The table depicts that on day one 34(85%) had moderate muscle cramps and 6(15%) had severe cramps respectively. On day three,2(5%) had mild cramps, 36(90%)had moderate cramps and 2(5%) had severe muscle cramps. This implies that most of the patient had persistence of muscle cramps through out the haemodialysis session.

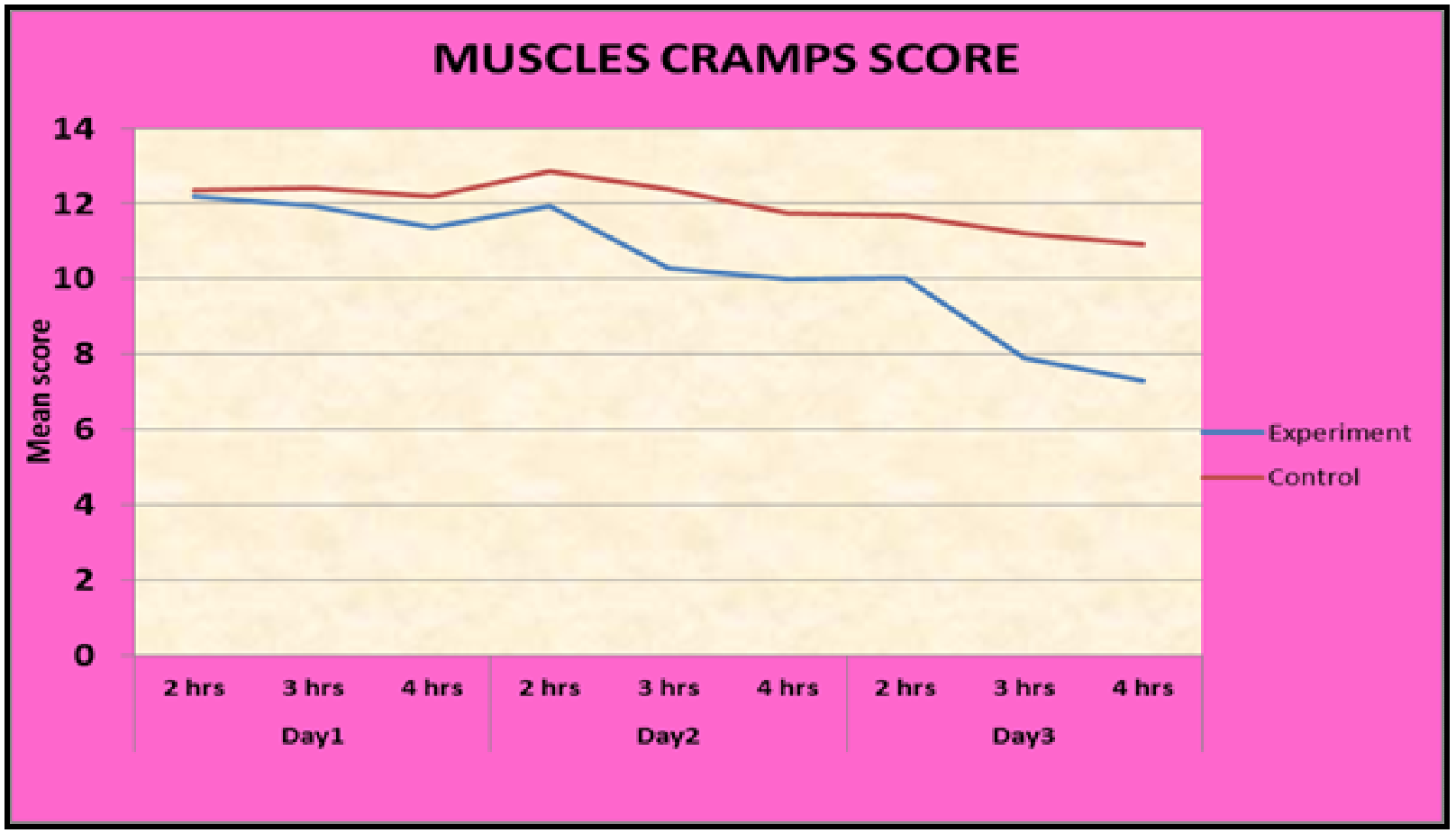
# SECTION – C

***TABLE-4 : LEVEL OF MUSCLE CRAMPS AFTER INTERVENTION***

| Day | Time duration | Level of muscle cramps | Experimental group | |
|---|---|---|---|---|
| | | | n | % |
| Day1 | 2 hrs | Moderate | 34 | 85.0% |
| | | Severe | 6 | 15.0% |
| | 3 hrs | Moderate | 35 | 87.5% |
| | | Severe | 5 | 12.5% |
| | 4 hrs | Mild | 2 | 5.0% |
| | | Moderate | 36 | 90.0% |
| | | Severe | 2 | 5.0% |
| Day2 | 2 hrs | Moderate | 39 | 97.5% |
| | | Severe | 1 | 2.5% |
| | 3 hrs | Mild | 6 | 15.0% |
| | | Moderate | 34 | 85.0% |
| | | Severe | 0 | 0.0% |
| | 4 hrs | Mild | 12 | 30.0% |
| | | Moderate | 28 | 70.0% |
| Day3 | 2 hrs | Mild | 8 | 20.0% |
| | | Moderate | 32 | 80.0% |
| | 3 hrs | Mild | 17 | 42.5% |
| | | Moderate | 23 | 57.5% |
| | 4 hrs | Mild | 28 | 70.0% |
| | | Moderate | 12 | 30.0% |
| | | Severe | - | 0% |

The table describes that,on day one 34(85%) of the patient had moderate and 6(15%) severe muscle cramps respectively. On day three at the end of fourth hour 28(70%) of them had mild cramps and 12(30%) had moderate cramps and no one had evidenced severe muscle cramps.

***Figure 7 :Mean muscle cramp score***




The above figure depicts the mean muscle cramp score from day one to day three. The mean score was reduced from 12.20 to 7.30 among experimental group and in control group the mean score was reduced from 12.35 to 10.93 only.

***TABLE-5 :DAY WISE AND HOUR WISE CHARACTERISTICS OF MUSCLES CRAMPS AFTER THE INTERVENTION***

| | | | Group | | | | Pearson chi-square test |
|---|---|---|---|---|---|---|---|
| | | | Experiment | | Control | | |
| | | | n | % | n | % | |
| Day1 | 2 hrs | Moderate | 34 | 85.0% | 34 | 85.0% | $\chi 2=0.00$ P=1.00 DF=1 |
| | | Severe | 6 | 15.0% | 6 | 15.0% | |
| | 3 hrs | Moderate | 35 | 87.5% | 34 | 85.0% | $\chi 2=0.11$ P=0.74 DF=1 |
| | | Severe | 5 | 12.5% | 6 | 15.0% | |
| | 4 hrs | Mild | 2 | 5.0% | 0 | 0.0% | $\chi 2=2.05$ P=0.35 DF=1 |
| | | Moderate | 36 | 90.0% | 38 | 95.0% | |
| | | Severe | 2 | 5.0% | 2 | 5.0% | |
| Day2 | 2 hrs | Moderate | 39 | 97.5% | 38 | 95.0% | $\chi 2=0.35$ P=0.55 DF=1 |
| | | Severe | 1 | 2.5% | 2 | 5.0% | |
| | 3 hrs | Mild | 6 | 15.0% | 1 | 2.5% | |
| | | Moderate | 34 | 85.0% | 36 | 90.0% | $\chi 2=6.61$ P=0.03 DF=1 |
| | | Severe | 0 | 0.0% | 3 | 7.5% | |
| | 4 hrs | Mild | 12 | 30.0% | 3 | 7.5% | $\chi 2=6.65$ P=0.01 DF=1 |
| | | Moderate | 28 | 70.0% | 37 | 92.5% | |
| Day3 | 2 hrs | Mild | 8 | 20.0% | 2 | 5.0% | $\chi 2=4.11$ P=0.04 DF=1 |
| | | Moderate | 32 | 80.0% | 38 | 95.0% | |
| | 3 hrs | Mild | 17 | 42.5% | 3 | 7.5% | $\chi 2=13.06$ P=0.001*** DF=1 |
| | | Moderate<br>Severe | 23<br>- | 57.5%<br>- | 34<br>3 | 85%<br>7.5 | |
| | 4 hrs | Mild | 28 | 70.0% | 2 | 5% | $\chi 2=9.44$P=0.002**DF=1 |
| | | Moderate<br>Severe | 12<br>- | 30%<br>0% | 36<br>2 | 90%<br>5% | |

* significant at P≤0.05 ** highly significant at P≤0.01 *** very high significant at P≤0.001

The table shows that the level of muscle cramps after intervention progressively reduced from severe to mild in third and fourth hour from day one to day three in experimental group which is statistically significant.

# SECTION -D

***TABLE-6 : COMPARISON OF MEAN MUSCLE CRAMPS SCORE***

| | | Experiment | | Control | | Student independent t-test |
|---|---|---|---|---|---|---|
| | | Mean | SD | Mean | SD | |
| Day1 | 2 hrs | 12.20 | 1.38 | 12.35 | 2.27 | t=0.36 P=0.72DF=78 |
| | 3 hrs | 11.95 | 1.74 | 12.40 | 1.92 | t=1.09 P=0.27 DF=78 |
| | 4 hrs | 11.35 | 1.59 | 12.20 | 1.74 | t=2.28 P=0.02* DF=78 |
| Day2 | 2 hrs | 11.93 | 1.53 | 12.85 | 1.82 | t=2.46 P=0.02* DF=78 |
| | 3 hrs | 11.28 | 1.55 | 12.38 | 1.96 | t=5.32 P=0.001*** DF=78 |
| | 4 hrs | 10.00 | 1.40 | 11.73 | 1.47 | t=5.38 P=0.001*** DF=78 |
| Day3 | 2 hrs | 10.03 | 1.58 | 11.68 | 2.00 | t=4.09 P=0.001*** DF=78 |
| | 3 hrs | 7.90 | 1.32 | 11.20 | 1.95 | t=8.86 P=0.001*** DF=78 |
| | 4 hrs | 7.30 | 1.30 | 10.93 | 2.29 | t=8.72P=0.001*** DF=78 |

* significant at P≤0.05 ** highly significant at P≤0.01 *** very high significant at P≤0.001

The table shows the comparison of mean muscle cramps score between experimental and control group. The mean and standard deviation in experimental group is statistically significance from day two. Statistical significance was calculated using students independent t-test.

***TABLE-7 : EFFECTIVENESS OF INTRADIALYTIC LOW-INTENSITY STRETCHING EXERCISE SCORE***

| | | Min – Max score | Experiment | Control | Difference in percentage |
|---|---|---|---|---|---|
| | | | Mean score % | Mean score % | |
| Day1 | 2 hrs | 4 -20 | 61.0% | 61.8% | 0.80% |
| | 3 hrs | 4 -20 | 59.8% | 62.0% | 2.20% |
| | 4 hrs | 4 -20 | 56.8% | 61.0% | 4.20% |
| Day2 | 2 hrs | 4 -20 | 59.7% | 64.3% | 4.60% |
| | 3 hrs | 4 -20 | 56.4% | 61.9% | 5.50% |
| | 4 hrs | 4- 20 | 50.0% | 58.7% | 8.70% |
| Day3 | 2 hrs | 4 -20 | 50.2% | 58.4% | 8.20% |
| | 3 hrs | 4 -20 | 39.5% | 56.0% | 16.50% |
| | 4 hrs | 4 -20 | 36.5% | 54.7% | 18.20% |

The table shows day wise and hour wise characteristics of muscles cramps. Initially experiment group patients have 61% score after three days intradialytic low-intensity stretching exercise they are able to reduce to 36.5%. Whereas in control group patients initially they have 61.8% score after three days using routine treatments they are able to reduce to 54.7% after three days. Each day and each hour assessment shows experiment group patients are having more reduction than control group patients.

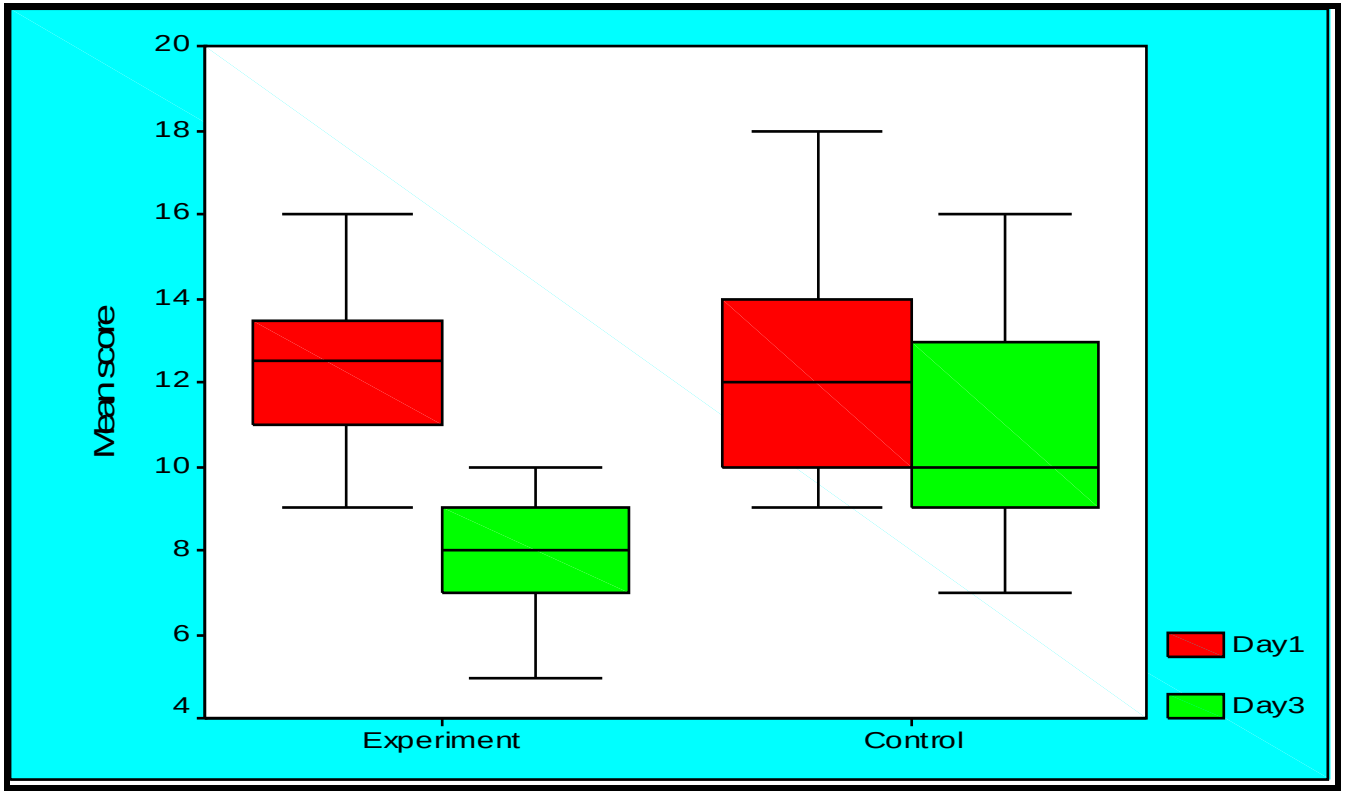
***TABLE-8 : COMPARISON OF POST TEST LEVEL OF SCORE BETWEEN EXPERIMENT AND CONTROL GROUP***

| | Day1 | | Day3 | | Reduction Difference (day1-day2) | |
|---|---|---|---|---|---|---|
| | **Mean** | **SD** | **Mean** | **SD** | **Mean** | **SD** |
| Experiment | 12.20 | 1.38 | 7.30 | 1.30 | 4.30 | 2.03 |
| Control | 12.35 | 2.27 | 10.93 | 2.29 | 1.42 | 3.16 |
| Student's Independent t-test | t=0.36 P=0.72DF=78 not significant | | t=8.72p=0.001*** DF=58 significant | | t=4.85 p=0.001*** DF=28 significant | |

* significant at P≤0.05 ** highly significant at P≤0.01 *** very high significant at P≤0.001

The table depicts that, in experiment group, baseline and third day score difference is 4.30, whereas in control group, baseline and third day score difference is 1.42. Difference between experiment and control group is statistically significant. Statistical significance was calculated using student's independent t-test.

***Figure 8 :BoxPlot compares the Day1 and Day3 mean muscles cramps score***




The figure depicts that, the mean score was reduced from 12.20 to 7.30 among experimental group on day three and in control group the mean score was reduced from 12.35 to 10.93.In experiment group, third day score difference is 4.30, whereas in control group, baseline and third day score difference is 1.42. Difference between experiment and control group is statistically significant.

***Table-9 : OVERALL EFFECTIVENESS OF INTRADIALYTIC LOW-INTENSITY STRETCHING EXERCISE***

| | **Max score** | **Baseline Pain score** | **Day3 Pain score** | **Mean Difference in cramps score with 95% Confidence interval** | **Percentage Difference in cramps score with 95% Confidence interval** |
|---|---|---|---|---|---|
| Experiment | 20 | 12.20 | 7.30 | 4.90 (4.29 – 5.50) | 24.5% (21.5% – 27.5%) |
| Control | 20 | 12.35 | 10.93 | 1.42 (0.41 – 2.42) | 7.1% (2.1% – 12.1%) |

This table shows the effectiveness of exercise (24.5%) in experiment group, whereas in control group it is only 7.1%. Experiment group benefited more than control group (24.5 – 7.1= 17.4%). This is the net effect of the study.

# SECTION – E

***Table-10 : ASSOCIATION BETWEEN POST TEST LEVEL OF MUSCLES CRAMPS AND DEMOGRAPHIC VARIABLE (Experiment group)***

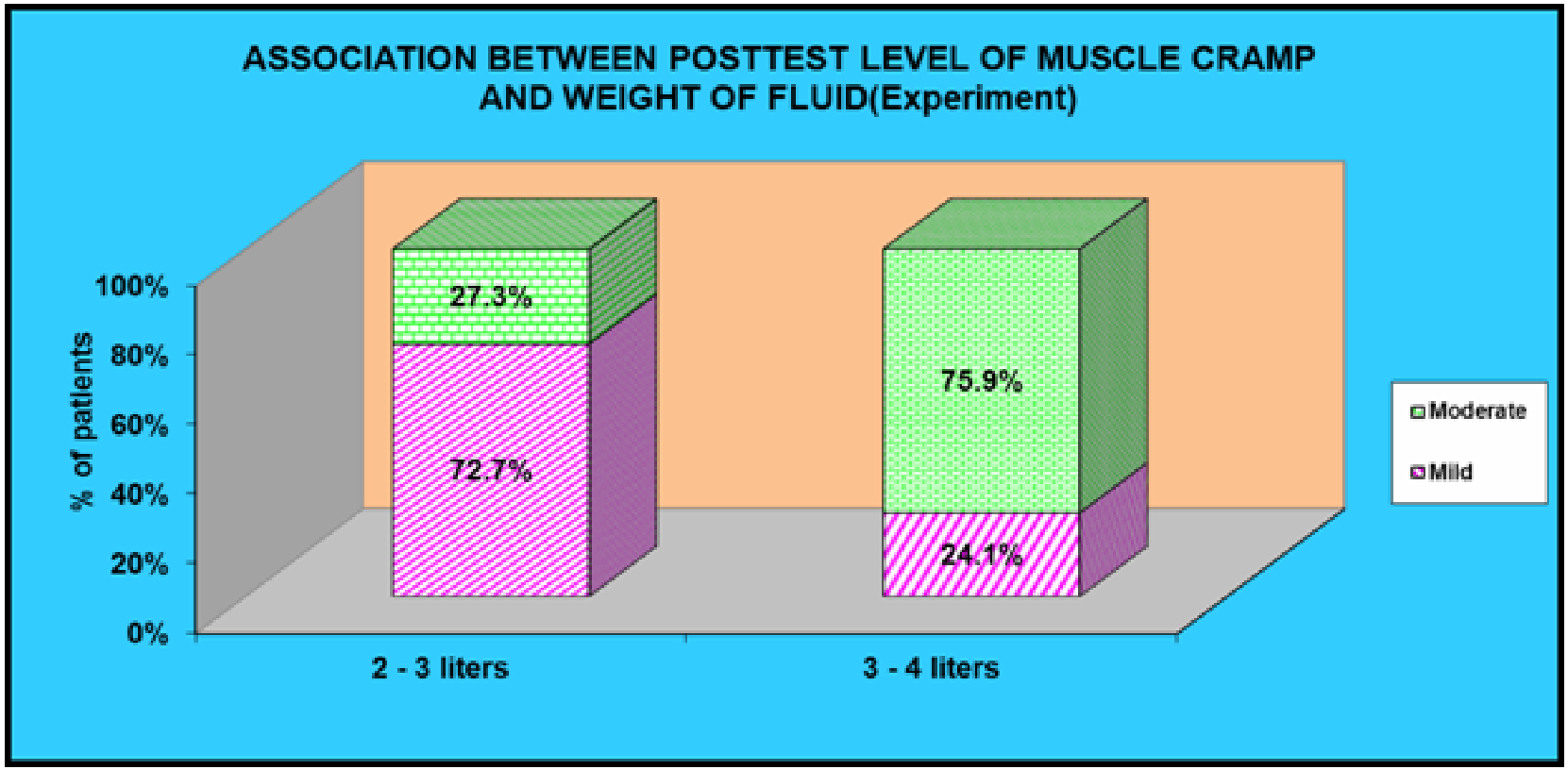
| Demographic variables | | Level of Muscles cramps score | | | | Total | Pearson Chi-square test |
|---|---|---|---|---|---|---|---|
| | | Mild | | Moderate | | | |
| | | n | % | n | % | | |
| Age | 20 -30 yrs | 3 | 30.0% | 7 | 70.0% | 10 | $\chi 2=2.40$ P=0.30 DF=1 |
| | 31 -40 yrs | 5 | 50.0% | 5 | 50.0% | 10 | |
| | >40 yrs | 12 | 60.0% | 8 | 40.0% | 20 | |
| Sex | Male | 8 | 42.1% | 11 | 57.9% | 19 | $\chi 2=0.90$ P=0.34 DF=1 |
| | Female | 12 | 57.1% | 9 | 42.9% | 21 | |
| Religion | Hindu | 15 | 50.0% | 15 | 50.0% | 30 | $\chi 2=0.40$ P=0.82 DF=1 |
| | Muslim | 2 | 40.0% | 3 | 60.0% | 5 | |
| | Christian | 3 | 60.0% | 2 | 40.0% | 5 | |
| Life Style | Active | 2 | 40.0% | 3 | 60.0% | 5 | $\chi 2=0.46$ P=0.79 DF=1 |
| | Limited Activity | 7 | 46.7% | 8 | 53.3% | 15 | |
| | Sedentary | 11 | 55.0% | 9 | 45.0% | 20 | |
| Previous experience of muscle cramps | Yes | 17 | 51.5% | 16 | 48.5% | 33 | $\chi 2=0.17$ P=0.68 DF=1 |
| | No | 3 | 42.9% | 4 | 57.1% | 7 | |

| Demographic variables | | Level of Muscles cramps score | | | | Total | Pearson Chi-square test |
|---|---|---|---|---|---|---|---|
| | | Mild | | Moderate | | | |
| | | n | % | n | % | | |
| Measures taken to cope up with muscle cramps | Walking | 3 | 60.0% | 2 | 40.0% | 5 | $\chi 2=1.04$ P=0.90 DF=1 |
| | Massaging | 3 | 42.9% | 4 | 57.1% | 7 | |
| | Hot / Cold application | 10 | 55.6% | 8 | 44.4% | 18 | |
| | Medications | 3 | 42.9% | 4 | 57.1% | 7 | |
| | Others | 1 | 33.3% | 2 | 66.7% | 3 | |
| Weight of Fluid | 2 - 3 liters | 8 | 72.7% | 3 | 27.3% | 11 | $\chi 2=8.03$ P=0.001 DF=1 |
| | 3 - 4 liters | 7 | 24.1% | 22 | 75.9% | 29 | |
| Frequency of Dialysis | Twice | 3 | 75.0% | 1 | 25.0% | 4 | $\chi 2=1.11$ P=0.29 DF=1 |
| | Thrice | 17 | 47.2% | 19 | 52.8% | 36 | |
| Patterns of Muscle Cramps | Constant | 8 | 32.0% | 17 | 68.0% | 25 | $\chi 2=8.64$ P=0.01*** DF=1 |
| | Intermittent | 12 | 80.0% | 3 | 20.0% | 15 | |
| Duration of dialysis | > 3 months | 16 | 61.5% | 10 | 38.5% | 26 | $\chi 2=3.96$ P=0.04* DF=1 |
| | < 3 months | 4 | 28.6% | 10 | 71.4% | 14 | |

* significant at $P \leq 0.05$ ** highly significant at $P \leq 0.01$ *** very high significant at $P \leq 0.001$

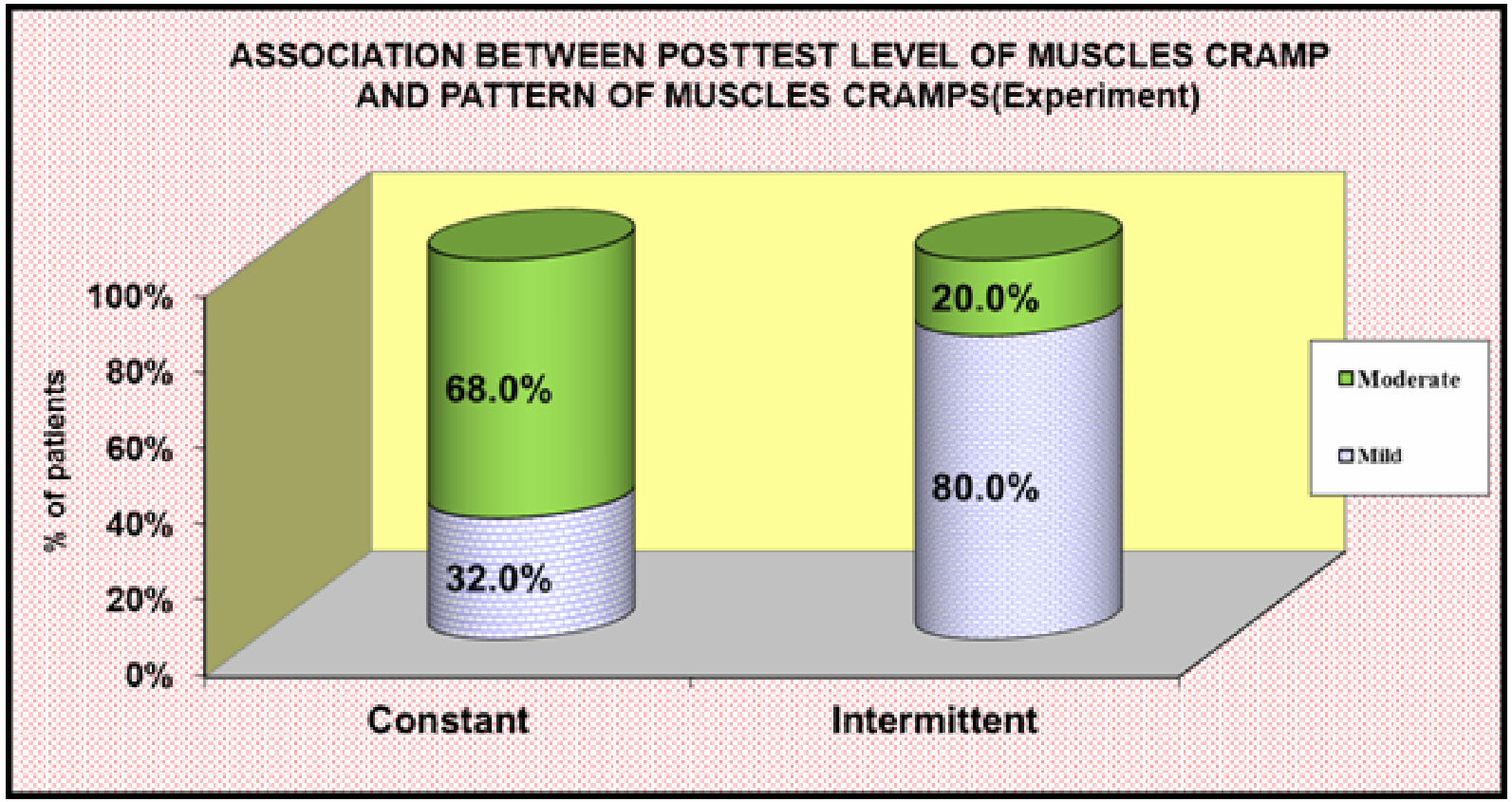
The table shows the association between demographic variables and their level of muscles cramps score. More weight of fluid shows significant and constant patterns of muscle cramps shows highly significant.. In which weight of fluid shows very high significance. Statistical significance was analyzed using Pearson chi-square test.

***Figure 9 : Association between post test level of muscle cramps and weight of fluid***



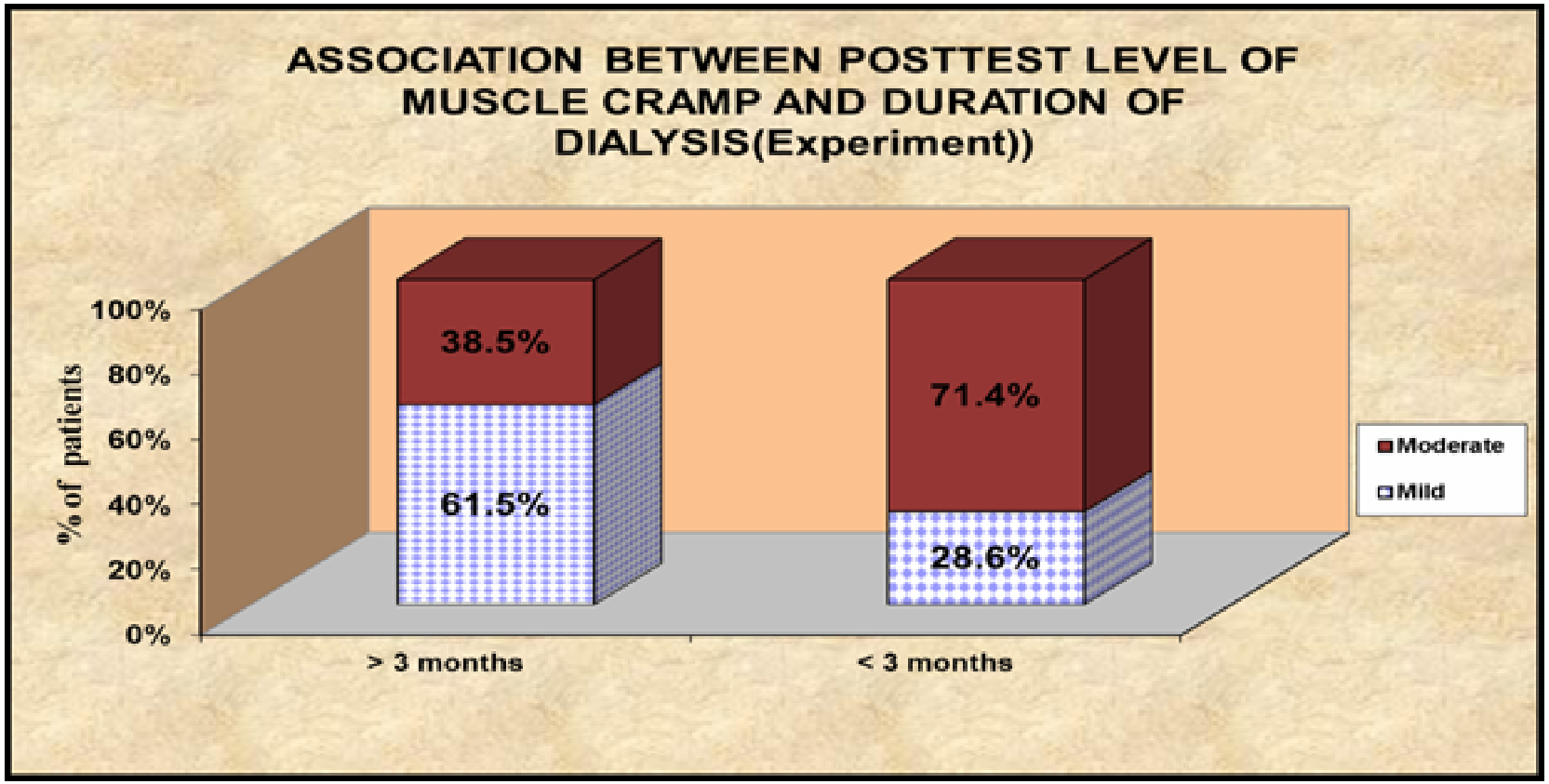

The above figure depicts the association of experimental group between the level of muscle cramps and weight of fluid removal during haemodialysis.

*Figure 10 : Association between post test level of muscle cramp and pattern of muscle cramps*




The above figure depicts the association of experimental group between the level of muscle cramps and patterns of muscle cramps during haemodialysis.

*Figure 11 : Association between post level of muscle cramp and duration of dialysis*




The above figure depicts the association of experimental group between the level of muscle cramps and duration of haemodialysis.

# CHAPTER-V
# DISCUSSION

This chapter deals with the discussion of results of the data analysed based on the objectives of the study. The purpose of the study is to assess the effectiveness of intradialytic low-intensity stretching exercise on muscle cramps among patients undergoing haemodialysis.

The Rajiv Gandhi Government General Hospital is one of the oldest and biggest hospital in Tamilnadu, and the tertiary referral centre that cater speciality and superspeciality services all over the state. Averagely,15-17 patients were undergoing haemodialysis in Department of Nephrology daily. Muscle cramps is a common and clinically important problem which occurs during haemodialysis. 80 patients between age group of 20- 70 years who are undergoing haemodialysis treatment regularly in Nephrology ward were selected by simple random sampling technique and assigned to experimental (40) and control group (40) on the basis of inclusion criteria.

***Carlson et al (2007)*** outlines staff responsibilities to exercise for dialysis patients, including how the staff can influence patients, administrative roles, and assessing resources. Thus he explains that patient need motivation and encouragement to exercise regularly and may need extra encouragement. Continuous education, counseling, and reinforcement with the patients will be needed to make exercise as a routine part of the dialysis treatment.

## CHARECTERISTICS OF DEMOGRAPHIC VARIABLES

The demographic characteristics of 80 patients who participated in the study were described in terms of frequency percentage that 17(42.5%) in experimental group and 14(35%) in control group were in the age group of 41-50 years and nearly 33(82%) were male in both the group. Nearly 33(82.5%) in both the groups have previous experience of muscle cramps. 36(90%) in the experimental group and 32(80%) in control cramps were undergoing haemodialysis thrice a week. Nearly 30(75%) of the clients in

both the groups, the weight of the fluid removal during haemodialysis is 3-4 litres. 25(62.5%) in the experimental group and 19(47.5%0 in control group client were having constant muscle cramps through out the haemodialysis session. Nearly 26(65%) of them in experimental group, 21(52.5%) in control group were undergoing haemodialysis for more than three months.

## DISCUSSION OF THE STUDY BASED ON THE OBJECTIVES

### *The first objective is to assess the characteristics of muscle cramps among control group.*

The semi structured questionnaire was to assess the characteristics of muscle cramps. The control group patients received routine management for muscle cramps. Some of the treatment include administration of medications, intravenous fluids like dextrose, normal saline etc. The characteristics of muscle cramps are assessed from first hour till the end of dialysis treatment and noted the frequency, intensity, quality, intensity of muscle cramps and the muscle tone assessment.

It is evident that, after assessing the day wise assessment of muscle cramps in the control group, 34(85%) of them on first day have moderate muscle cramp and 3(7.5%) had severe muscle cramp. On day three at the end of third hour,34(85%) had moderate cramps and remaining 6(15%) had mild and severe cramps equally .At the end of fourth hour 36(90%) had moderate cramps and2(5%) of them had mild and severe cramps. The mean score of muscle cramps after routine treatment on day one is 12.35 and there was not much difference in reduction of the mean score on third day 10.93 .This implies that most of the patients perceive muscle cramps persistently through out the haemodialysis session.

The three conditions that seem to increase cramping are hypotension, the patient being below dry weight and use of low sodium dialysis solution. The severe muscle cramping experienced near the end of the dialysis treatment and persisting for a time after dialysis often is due to dehydration.

***The second objective was to assess the characteristics of muscle cramps among the experimental after intervention.***

It represents the characteristics of muscle cramps in the experimental group. It is evident that, after assessing the day wise assessment of muscle cramps in the experimental group, 34(85%) of them on first day had moderate muscle cramps and 6(15%) had severe muscle cramp. On day three at the end of fourth hour 28(70%) had mild cramps and 12(30%) had moderate cramp and no one have evidenced severe cramps. The mean score of muscle cramps after intradialytic low-intensity stretching exercise on day one is 12.20 among experimental group the mean muscle score on third day is 7.30 among experimental group, which is significantly reduced on day 3.

This explains that the characteristics of muscle cramps vary significantly from day one to day three of haemodialysis. The patients those who received intervention reported reduced frequency, duration, intensity, quality of muscle cramps. This may be due to the significant influence of intradialytic low intensity stretching exercise on muscle cramps.

The result is consistent with the study conducted by ***Tuney (2006)*** published that the severe muscle cramps are experienced near the end of dialysis treatment. He suggested to try a program of gentle stretching exercises targeted at the muscles which tend to decrease the cramp during the end of the dialysis.

***The third objective is to evaluate the effectiveness of intradialytic low intensity stretching exercise on muscle cramps among experimental group.***

The effectiveness of exercise was summarized in table 7 and 8. Intradialytic exercise programs are important to enhance patient's physical functioning, exercise capacity, and improve overall health. The research on exercise and dialysis clearly shows a positive benefit for patients with End Stage Renal Disease. Initially experiment group, patients had mean score of 61% , after 3 days of intradialytic low-intensity stretching exercise they were able to reduce to 36.5% after 3days. Whereas in control group, initially they had 61.8% score after 3 days using routine treatments they were able to

reduce to 54.7% after 3days. Each day and each hour assessment shows experiment group patients are having more reduction than control group patients.

The level of muscle cramps after intervention progressively reduced from severe to mild in the third and fourth hour from day one to day three in the experimental group which is statistically significant.

When comparing the post test level score in experiment group, baseline and third day score difference is 4.30, whereas in control group, baseline and third day score difference is 1.42. Difference between experiment and control group is statistically significant. Statistical significance was calculated using student's independent t-test.

Overall the effectiveness of intervention is 24.5% in experimental group, whereas with routine care control group is 7.1%. Experimental group benefitted more than control group (17.4%). This shows that intradialytic low-intensity stretching exercise will reduce the frequency, duration, quality, intensity and muscle tone.

The results were consistent with a study conducted by ***Dan Bayliss (2009),*** this study depicts that **s**tarting and managing an intradialytic exercise program for ESRD patients can become a reality and a standard treatment of care for dialysis patients. The goal of this article is to define the components needed to begin and manage an effective intradialytic exercise program.

The similar findings is noted in a study conducted by ***Coppin (2005)*** quoted an uncontrolled study which suggested that calf- stretching exercises could prevent nocturnal leg cramp in patients with long term dialysis treatment. It reduces the occurrence of leg cramps during dialysis session.

In a study conducted by ***Hansen (2005)*** found that to relieve an established cramp one must passively stretch the contracting muscle. Prophylactic stretching of the particular muscle can also prevent attack of cramps.

***The fourth objective is to associate the effectiveness of intradialytic low-intensity stretching exercise with selected demographic variables.***

The table 9 shows the association between demographic variables and the level of muscles cramps score. More weight of fluid, constant patterns of muscle cramps and less duration of dialysis are the significant factors. The Statistical significance was analyzed using Pearson chi square test.

There is a statistically significant association between demographic variables and the level of muscles cramps score. There is a strong association (P=0.001) between weight of the fluid removed and level of muscle cramps. The patients with more amount of fluid removal experiences severe muscle cramps.

There is a strong association (P=0.01) between patterns of muscle cramps and level of muscle cramps. The patients who experienced cramps constantly through out the procedure experiences moderate level of cramps. On the other hand, patients with intermittent cramps through out the haemodialysis cycle experienced only mild cramps.

There is a strong association (P=0.04) between duration of haemodialysis and level of muscle cramps. The patients who are under treatment for less than three months experiences muscle cramps more than the patients with duration of treatment for more than three months. The acute renal failure patients are more prone for muscle cramps than those with chronic renal failure.

The result was consistent with a study conducted by ***Jansen P.H.P, (2009)*** on past and current understanding of the pathophysiology of muscle cramps, treatment of leg cramps. Relevant hypotheses on the pathophysiology of muscle cramps are reviewed. Psychosomatic, vascular, myogenic and neural theories are highlighted from a clinician's point of view. Cramps also may be experienced in other conditions that feature an unusual distribution of body fluid, weight of the fluid removal, electrolytes loss, frequency of dialysis, low potassium levels occasionally cause muscle cramps, although it is more common for low potassium to be associated with muscle cramps.

Treatment for cramping vary from unit to unit. When patients are having cramping and have low blood pressure, the staff may give normal saline. This will increase the fluid in the body and muscle cramping may be relieved to some extent. In addition, hypertonic saline or glucose may be given. Heat and massage for the cramping muscle can ease the pain.. For chronic leg cramps they may prescribe Quinine, Carnitine, or another medication.

A formal intradialytic exercise regimen can produce objective evidence of improvement in physical performance of the patients. Intra-dialytic low-intensity progressive strength training was safe and effective among maintenance dialysis patients. Thus, the investigator had tried a program of gentle stretching and toning exercises targeted at the muscles which may tend to cramp during dialysis.

Intradialytic exercise programs are important to enhance patient physical functioning, exercise capacity, and improve overall health. This should become a standard of treatment for all dialysis units. Although having an exercise professional to run the program would be ideal, with the available resources to the dialysis community, an exercise program could become a reality managed solely by the dialysis staff.

These findings suggested that the exercise was effective in terms of reduction in the frequency, intensity, duration, quality and muscle tone in the experimental group. The nurse must be alert to spend time to assess risk factors for muscle cramps and develop nursing strategies to prevent or reduce the incidence of muscle cramps during haemodialysis.

# CHAPTER-VI
# SUMMARY, CONCLUSION, IMPLICATION, RECOMMENDATIONS AND LIMITATIONS

This chapter deals with the summary of the study and conclusion drawn. It focuses on the implications and given recommendations for nursing practices, nursing research, nursing administration, nursing education and limitations of the study.

## 6.1. SUMMARY OF THE STUDY

The focus of the study was to assess the effectiveness of intradialytic low-intensity stretching exercise on muscle cramps among patients undergoing haemodialysis at Dialysis unit, Rajiv Gandhi Government General Hospital, Chennai-3.

***The design of the study*** was true experimental – post test only control group design. A total number of 80 clients who are undergoing haemodialysis were selected for this study and selected them according to the inclusion criteria. A semi structured questionnaire was used to assess the characteristics of muscle cramps.

### *This study was carried out with the following objectives*

- To assess the characteristics of muscle cramps among control group
- To assess the characteristics of muscle cramps among experimental group after intervention
- To evaluate the effectiveness of intradialytic low-intensity stretching exercises on muscle cramps among experimental group
- To associate the effectiveness of intradialytic low-intensity stretching exercise with selected demographic variables

### *The study was based on the assumption that*

- Patient receiving intradialytic low- intensity stretching exercise will experience less muscle cramps.

- ❖ Stretching exercises improves perfusion

***The following hypotheses*** were set for the study and all hypotheses were tested at 0.05% of significance level.

- ❖ Patient receiving intradialytic low-intensity stretching exercise will experience less muscle cramps during dialysis than those who are not.
- ❖ Intradialytic low-intensity stretching exercise will reduce the frequency, duration, quality, intensity and muscle tone assessment.

***The variables of the study were***

Independent variable: Intradialytic low-intensity stretching exercise

Dependent variable: Muscle cramps

***The review of literature*** was done from primary and secondary sources that formed the basis of review related to muscle cramps and related to the effectiveness of physical exercises while undergoing haemodialysis. The conceptual framework adopted for this study was Modified Wiedenbach's Helping Art of Clinical Nursing Theory.

***The study setting was*** Dialysis unit, Department of Nephrology, Rajiv Gandhi Government General Hospital, Chennai-3.

After testing the validity and reliability, the same tool was used for the data collection.

***The pilot study*** was conducted after getting formal approval was obtained from the Professor and Head of the Department, Department of Nephrology. After obtaining informed consent from the patients the investigator conducted the pilot study by selecting 10 samples by using simple random sampling method. The investigator collected the information from the samples and the intradialytic low-intensity stretching exercise was provided to the clients and the effectiveness was seen at the end of fourth hour. The result revealed that the intervention reduces the frequency, intensity, duration, quality and muscle tone.

***The main study*** was conducted at the Dialysis unit, Department of Nephrology among 80 patients who are undergoing haemodialysis session routinely. The data was collected and analysed using descriptive and inferential statistics.

## 6.2. MAJOR FINDINGS OF THE STUDY

- The results showed that there was a significant difference between experimental and control group.

- The majority of patients 17(42.5%) in experimental group and 14(35%) in control group were in the age group of 41-50 years and nearly 33(82%) were male patients in both the groups. Nearly 33(82.5%) in both the groups had previous experience of muscle cramps. 36(90%) in the experimental group and 32(80%) in control cramps were undergoing haemodialysis thrice a week.

- Nearly 30(75%) of the patients in both the groups, the weight of the fluid removal during haemodialysis was 3-4 litres. 25(62.5%) in the experimental group and 19(47.5%0 in control group client were having constant muscle cramps through out the haemodialysis session. Nearly 26(65%) of them in experimental group, 21(52.5%) in control group were undergoing haemodialysis for more than three months.

- The mean muscle cramp score showed that the experimental group have 12.20(61%) score, after three days of intervention they are able to reduce to 7.30(36.5%). Whereas the control group showed 12.35(61.8%) score, after three days they are able to reduce to 10.93(54.7%) with routine treatments.

- The mean and standard deviation of muscle cramp score in experimental group is found to be significant ($P=0.001^{***)}$ from day two. The statistical significance was calculated using students independent t-test.

- The comparison of post test level score in experiment group on third

day score difference is 4.30, whereas in control group, baseline and third day score difference is 1.42. Difference between experiment and control group is statistically significant (P=0.001).

- Overall the effectiveness of intervention is 24.5% in experimental group, whereas with routine care in control group is 7.1%. Experimental group benefitted more than control group (17.4%). This shows that intradialytic low-intensity stretching exercise will reduce the frequency, duration, quality, intensity and muscle tone. This shows that there is an association that the patient receiving intradialytic low stretching exercise will experience less muscle cramps.

- There is a statistically significant association between level of muscle cramps and weight of fluid removal (P=0.001), patterns of muscle cramps (P=0.01) and duration of haemodialysis (P=0.04) respectively.

## 6.3. CONCLUSION

The present study assessed the effectiveness of intradialytic low-intensity stretching exercise among patients undergoing haemodialysis. The results revealed that intradialytic low-intensity stretching exercise can be effectively used to reduce the frequency, duration, quality, intensity and muscle tone of the patients who are undergoing haemodialysis. This intervention given during the haemodialysis session is simple and effective method to treat muscle cramps prophylactically. Intradialytic low-intensity stretching exercise can be added as an adjunct treatment for dialysis patients. Therefore the nurse working in haemodialysis unit should encourage the patients to do the simple exercise during the haemodialysis.

## 6.4. IMPLICATION

The investigator had drawn the following implications for the study, which are necessary in the field of nursing practice, nursing administration, nursing education, nursing research.

## NURSING PRACTICE

- Nurses have a vital role in caring patients who undergo haemodialysis. By doing this intradialytic low-intensity stretching exercise as a routine care during the cycle will reduce the occurance of muscle cramps

- This can be followed as a routine care during the haemodialysis cycle. It has to establish as a evidence based nursing practice.

## NURSING EDUCATION

- As nursing educator, we must strengthen the evidence based nursing practices among the undergraduate and postgraduate nursing students.

- The nursing education curriculum must provide adequate clinical exposure of students in needed clinical areas.

- By conducting work shop, seminars and conferences the knowledge can be updated.

## NURSING ADMINISTRATION

- The nursing administrator should take initiative in organizing the continuing nursing education programmes and in-service education programme on newly devised strategies such as intradialytic low-intensity stretching exercise.

- Patient and family awareness and training sessions can be conducted.

- The nursing administrator should supervise the intervention done for the patients by nurses and also monitor the standards of practice to promote excellence in nursing care.

## NURSING RESEARCH

- Nursing researcher should encourage clinical nurses to apply the research findings in their daily nursing care activities and can bring out new innovative procedures to reduce the muscle cramps.

- Encourage the non- pharmacological interventions. Nurse researcher can promote many studies on this topic.
- The researcher should conduct periodic review of research findings and disseminate the findings through conferences, seminars, publications in journals, and in the World Wide Web.

## 6.5. RECOMMENDATIONS

The study recommends the following for further research

- The study can be replicated with larger samples for better generalization
- The study can be done for peritoneal dialysis patients also
- The study can be done conducted in different settings with similar facilities
- This study can be done as a longitudinal study
- The study can be replicated with bio- physical parameters
- A comparative study can be conducted between pharmacological and non- pharmacological intervention

## 6.6. LIMITATIONS

- Some patients hesitate to continue this exercise because of severe cramps during haemodialysis
- The investigator could get more of abroad reviews than Indian reviews to support the present study
- The investigator found difficulty to stick over the time schedule due to Doctor rounds.

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# PROCEDURE OF INTRADIALYTIC LOW-INTENSITY STRETCHING EXERCISE

## INTRODUCTION

The intradialytic low- intensity stretching exercise which is been given for the patients under experimental group. The exercise is given at the end of first hour of haemodialysis cycle. The investigator concentrates on the calf muscles cramps.

## STEPS

- Initially, the patient was allowed to bend and extend the lower limbs for warming up.
- The investigator then supports the flexed knee joint of the patient and pulls the heel down slowly and flex the foot simultaneously.
- The flexion of the foot is maintained till the patient report a feeling of stretch in the calf muscle region.
- Then, the support of knee joint is released.
- The knee joint is slowly pushed down from the flexed position till it is flat. The stretch is maintained for 30 seconds and slowly released.
- This was repeated for three times with rest in between. The exercise was employed for both legs.
- The average time taken for exercise was 10-15minutes.

"ASSESS THE EFFECTIVENESS OF INTRADIALYTIC LOW-INTENSITY STRETCHING EXERCISE ON MUSCLE CRAMPS AMONG PATIENTS UNDERGOING HAEMODIALYSIS AT DIALYSIS UNIT, RAJIV GANDHI GOVERNMENT GENERAL HOSPITAL, CHENNAI-3 "

## DATA COLLECTION TOOL

## SECTION- A

### Questionnaire regarding demographic and clinical variables

**1.** Age
   a) 20 - 30 years
   b) 31 - 40 years
   c) 41 - 50 years
   d) 51 - 70 years

2. Sex
   a) Male
   b) Female

3. Religion
   a) Hindu
   b) Muslim
   c) Christian
   d) Others

4. Life style
   a) Active
   b) Limited activity
   c) Sedentary

### Clinical variables

5. Previous experience of muscle cramps
   a) Yes
   b) No

6. Measures taken to cope with muscle cramps
    a) Walking
    b) Distraction
    c) massaging
    d) Hot / Cold application
    e) Medications
    f) others
7. weight of fluid removed during haemodialysis
    a) 1 – 2 liters
    b) 2 – 3 liters
    c) 3 – 4 liters
    d) > 4 liters
8. Frequency of haemodialysis per week
    a) Once
    b) Twice
    c) Thrice
9. Patterns of muscle cramps
    a) Constant
    b) Intermittent
10. Duration of haemodialysis
    a) > 3 months
    b) < 3 months

## SECTION- B

**QUESTIONAIRE TO ASSESS THE CHARECTERISTICS OF MUSCLE CRAMPS- POST INTERVENTION**

| *Sl.No* | *Characteristics* | | *Post intervention* | | |
|---|---|---|---|---|---|
| | | *score* | *II Hour* | *III Hour* | *IV Hour* |
| 1. | Frequency of muscle cramps<br>a) 1-2 times<br>b) 2-3 times<br>c) 3-4 times<br>d) 4-5 times | <br>1<br>2<br>3<br>4 | | | |
| 2. | Duration of muscle cramps(minutes)<br>a) 1-3<br>b) 3-5<br>c) 5-7<br>d) >7 | <br>1<br>2<br>3<br>4 | | | |
| 3. | Quality of muscle cramps<br>a) Mild aching<br>b) Tingling<br>c) Burning<br>d) Throbbing | <br>1<br>2<br>3<br>4 | | | |
| 4. | Intensity of muscle cramps<br>a) No cramps<br>b) Mild cramps<br>c) Moderate cramps<br>d) Severe cramps | <br>1<br>2<br>3<br>4 | | | |
| 5. | Muscle tone assessment<br>a) Slight increase in tone with a 'catch'<br>b) Range of motion present but with minimal resistance<br>c) More marked increase tone through range of motion<br>d) Considerable increase in tone, passive movement difficult | <br>1<br>2<br>3<br>4 | | | |

**Scoring technique: Option a- 1, b-2, c-3, d-4 respectively (total score= 20)**

| Characteristics of muscle cramps | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| | Normal | Mild | Moderate | Severe |

Characteristics of cramps is differentiated in to -

Mild cramps - ( < 8)

Moderate cramps - ( 9-14)

Severe cramps - ( 15- 20)

# நேர்முக காணல் படிவம்

## பகுதி – I

புள்ளி விவர ஆய்வு

1) வயது (வருடங்களில்)

அ) 20-30 ☐

ஆ) 31-40 ☐

இ) 41-50 ☐

ஈ) 51-70 ☐

2) பாலினம்

அ) ஆண் ☐

ஆ) பெண் ☐

3) மதம்

அ) இந்து ☐

ஆ) முஸ்லிம் ☐

இ) கிறிஸ்தவர் ☐

ஈ) மற்றவை ☐

4) வாழ்க்கை முறை

அ) சுறுசுறுப்புடன் வேலை செய்பவர் ☐

ஆ) அளவான வேலை செய்பவர் ☐

இ) நடமாட்டமில்லாத வேலை செய்பவர் ☐

**<u>மருத்துவ குறிப்பு</u>**

5) இதற்கு முன் தசைப் பிடிப்பு ஏற்பட்ட அனுபவம் உள்ளதா?

அ) ஆம் ☐

ஆ) இல்லை ☐

6) தசைப் பிடிப்பு ஏற்படும் போது எந்த வழிமுறையுடன் ஒத்து செல்ல முடிகிறது?

அ) நடப்பது ☐

ஆ) கவனத்திருப்பம் ☐

இ) தேய்த்துவிடுவது ☐

ஈ) கூடான/ மிதமான ஒத்தடம் வைப்பது ☐

உ) மருந்து உட்கொள்வது ☐

ஊ) மற்றவை ☐

7) டையலைசிஸ் செய்யும்போது எவ்வளவு நீர் வெளியேற்றப்படுகிறது?

அ) 1-2 லிட்டர் ☐

ஆ) 2-3 லிட்டர் ☐

இ) 3-4 லிட்டர் ☐

ஈ) 4 லிட்டர்களுக்கு மேல் ☐

8) ஒரு வாரத்தில் எத்தனை முறை டையலைசிஸ் செய்கிறீர்கள்?

அ) ஒரு முறை ☐

ஆ) இரண்டு முறை ☐

இ) மூன்று முறை ☐

9) எந்த வகையான தசைப் பிடிப்பு

அ) எப்பொழுதும் இருப்பது ☐

ஆ) தொடர்ச்சியில்லாமல் இருப்பது ☐

10) ஹீமோடையலைசிஸ் கால அளவு

அ) மூன்று மாதத்திற்குள் ☐

ஆ) மூன்று மாதத்திற்கு மேல் ☐